

CPC**COOPERATIVE PATENT CLASSIFICATION****H01J****ELECTRIC DISCHARGE TUBES OR DISCHARGE LAMPS** (spark-gaps H01T; arc lamps with consumable electrodes H05B; particle accelerators H05H)**NOTE**

This subclass covers only devices for producing, influencing, or using a flow of electrons or ions, e.g. for controlling, indicating, or switching of electric current, counting electric pulses, producing light or other electromagnetic oscillations, such as X-rays, or for separating or analysing radiation or particles, and having a closed or substantially closed casing containing a chosen gas, vapour, or vacuum, upon the pressure and nature of which the characteristics of the device depend. Light sources using a combination (other than covered by group [H01J 61/96](#) of this subclass) of discharge and other kinds of light generation are dealt with in [H05B 35/00](#).

In this subclass, groups [H01J 1/00](#) to [H01J 7/00](#) relate only to: details of an unspecified kind of discharge tube or lamp, or

details mentioned in a specification as applicable to two or more kinds of tubes or lamps as defined by groups [H01J 11/00](#), [H01J 13/00](#), [H01J 15/00](#), [H01J 17/00](#), [H01J 21/00](#), [H01J 25/00](#), [H01J 27/00](#), [H01J 31/00](#), [H01J 33/00](#), [H01J 35/00](#), [H01J 37/00](#), [H01J 40/00](#), [H01J 41/00](#), [H01J 47/00](#), [H01J 49/00](#), [H01J 61/00](#), [H01J 63/00](#) or [H01J 65/00](#), hereinafter called basic kinds. A detail only described with reference to, or clearly only applicable to, tubes or lamps of a single basic kind is classified in the detail group appropriate to tubes or lamps of that basic kind, e.g. [H01J 17/04](#).

In this subclass, the following term is used with the meaning indicated:

- "lamp" includes tubes emitting ultra-violet or infra-red light.

Attention is drawn to the definition of the expression "spark gaps" given in the Note following the title of subclass H01T.

Apparatus or processes specially adapted for the manufacture of electric discharge tubes, discharge lamps, or parts thereof are classified in group [H01J 9/00](#).

H01J 1/00

Details of electrodes, of magnetic control means, of screens, or of the mounting or spacing thereof, common to two or more basic types of discharge tubes or lamps (details of electron-optical arrangements or of ion traps [H01J 3/00](#))

H01J 1/02

. Main electrodes

H01J 1/025

.. {Hollow cathodes}

H01J 1/04

.. Liquid electrodes, e.g. liquid cathode

H01J 1/05

... characterised by material

H01J 1/06

... Containers for liquid-pool electrodes; Arrangement or mounting thereof

H01J 1/08

... Positioning or moving the cathode spot on the surface of a liquid-pool cathode

- H01J 1/10 ... Cooling, heating, circulating, filtering, or controlling level of liquid in a liquid-pool electrode
- H01J 1/12 .. Cathodes having mercury or liquid alkali metal deposited on the cathode surface during operation of the tube
- H01J 1/13 .. Solid thermionic cathodes
- H01J 1/135 ... {Circuit arrangements therefor, e.g. for temperature control}
- H01J 1/14 ... characterised by the material
- H01J 1/142 with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material
- H01J 1/144 with other metal oxides as an emissive material
- H01J 1/146 with metals or alloys as an emissive material
- H01J 1/148 with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material
- H01J 1/15 ... Cathodes heated directly by an electric current
- H01J 1/16 characterised by the shape
- H01J 1/18 Supports; Vibration-damping arrangements
- H01J 1/20 ... Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
- H01J 1/22 Heaters ([filaments for incandescent lamps H01K 1/02](#))
- H01J 1/24 Insulating layer or body located between heater and emissive material
- H01J 1/26 Supports for the emissive material
- H01J 1/28 Dispenser-type cathodes, e.g. L-cathode
- H01J 1/30 .. Cold cathodes, e.g. field-emissive cathode
- H01J 1/304 ... Field-emissive cathodes
- H01J 1/3042 {microengineered, e.g. Spindt-type}
- H01J 1/3044 {Point emitters}
- H01J 1/3046 {Edge emitters}
- H01J 1/3048 {Distributed particle emitters}
- H01J 1/308 ... Semiconductor cathodes, e.g. cathodes with PN junction layers
- H01J 1/312 ... having an electric field perpendicular to the surface, e.g. tunnel-effect cathodes of Metal-Insulator-Metal [MIM] type {([H01J 1/304 to H01J 1/308 take precedence](#))}
- H01J 1/316 ... having an electric field parallel to the surface, e.g. thin film cathodes
- H01J 1/32 .. Secondary-electron-emitting electrodes ([H01J 1/35 takes precedence](#); [luminescent screens H01J 1/62](#); [charge storage screens in general H01J 1/78](#); [charge storage screens using secondary emission for image tubes H01J 29/41](#); [dynodes for secondary emission tubes H01J 43/10](#); [secondary-emission detectors for measurement of nuclear or X-radiation G01T 1/28](#))
- H01J 1/34 .. Photo-emissive cathodes ([H01J 1/35 takes precedence](#); [photoelectric screens H01J 1/78](#))
- H01J 1/35 .. Electrodes exhibiting both secondary emission and photo-emission
- H01J 1/36 .. Solid anodes; Solid auxiliary anodes for maintaining a discharge
- H01J 1/38 ... characterised by the material
- H01J 1/40 ... forming part of the envelope of the tube or lamp
- H01J 1/42 ... Cooling of anodes ([cooling rotary anodes H01J 1/44](#)); Heating of anodes

- H01J 1/44 . . . Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes
- H01J 1/46 . Control electrodes, e.g. grid ([for igniting arrangements H01J 7/30](#)); Auxiliary electrodes ([auxiliary anodes for maintaining a discharge H01J 1/36](#))
- H01J 1/48 . . characterised by the material
- H01J 1/50 . Magnetic means for controlling the discharge
- H01J 1/52 . Screens for shielding ([screens acting as control electrodes H01J 1/46](#)); Guides for influencing the discharge; Masks interposed in the electron stream
- H01J 1/53 . Electrodes intimately associated with a screen on or from which an image or pattern is formed, picked up, converted, or stored {[see provisionally also H01J 29/08 to 29/36](#)}
- H01J 1/54 . Screens on or from which an image or pattern is formed, picked up, converted, or stored; Luminescent coatings on vessels {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/56 . . acting as light valves by shutter operation, e.g. for eidophor {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/58 . . acting by discolouration, e.g. halide screen {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/60 . . Incandescent screens {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/62 . . Luminescent screens; Selection of materials for luminescent coatings on vessels {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/63 . . . characterised by the luminescent material ([luminescent materials or compositions C09K 11/00](#)) {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/64 . . . characterised by the binder or adhesive for securing the luminescent material to its supports {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/66 . . . Supports for luminescent material ([vessels H01J 5/02](#)) {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/68 . . . with superimposed luminescent layers {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/70 . . . with protective, conductive, or reflective layers {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/72 . . . with luminescent material discontinuously arranged, e.g. in dots or lines {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/74 with adjacent dots or lines of different luminescent material {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/76 . . . provided with permanent marks or references {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/78 . . Photoelectric screens; Charge-storage screens {[see provisionally also H01J 29/08 to H01J 29/36](#)}
- H01J 1/88 . Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies
- H01J 1/90 . . Insulation between electrodes or supports within the vacuum space ([leading-in conductors H01J 5/46](#))
- H01J 1/92 . . Mountings for the electrode assembly as a whole
- H01J 1/94 . . Mountings for individual electrodes ([for directly-heated cathodes H01J 1/15](#))
- H01J 1/96 . . Spacing members extending to the envelope
- H01J 1/98 . . . without fixed connection between spacing member and envelope

- H01J 3/00** **Details of electron-optical or ion-optical arrangements or of ion traps common to two or more basic types of discharge tubes or lamps**
- H01J 3/02 . Electron guns {(electron guns for discharge tubes with provision for introducing objects or material to be exposed to the discharge [H01J 37/06](#); for cathode ray tubes [H01J 29/48](#)}
- H01J 3/021 .. {Electron guns using a field emission, photo emission, or secondary emission electron source}
- H01J 3/022 ... {with micro-engineered cathode, e.g. Spindt-type}
- H01J 3/023 .. {Electron guns using electron multiplication}
- H01J 3/024 .. {Electron guns using thermionic emission of cathode heated by electron or ion bombardment or by irradiation by other energetic beams, e.g. by laser}
- H01J 3/025 .. {Electron guns using a discharge in a gas or a vapour as electron source (gas-filled discharge tubes with gaseous cathodes [H01J 15/00](#))}
- H01J 3/026 .. {Eliminating deleterious effects due to thermal effects, electric or magnetic field ([H01J 3/021](#) to [H01J 3/025](#) take precedence)}
- H01J 3/027 .. {Construction of the gun or parts thereof ([H01J 3/021](#) to [H01J 3/025](#), [H01J 3/026](#) and [H01J 3/028](#) take precedence)}
- H01J 3/028 .. {Replacing parts of the gun; Relative adjustment ([H01J 3/021](#) to [H01J 3/025](#) take precedence)}
- H01J 3/029 .. {Schematic arrangements for beam forming}
- H01J 3/04 . Ion guns {see provisionally also [H01J 27/00](#)}
- H01J 3/06 . two or more guns being arranged in a single vacuum space, e.g. for plural-ray tubes ([H01J 3/07](#) takes precedence){see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/07 . Arrangements for controlling convergence of a plurality of beams {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/08 . Arrangements for controlling intensity of ray or beam ([H01J 3/02](#), [H01J 3/04](#) take precedence){see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/10 . Arrangements for centering ray or beam ([H01J 3/02](#), [H01J 3/04](#) take precedence){see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/12 . Arrangements for controlling cross-section of ray or beam; Arrangements for correcting aberration of beam, e.g. due to lenses ([H01J 3/02](#), [H01J 3/04](#) take precedence){see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/14 . Arrangements for focusing or reflecting ray or beam ([H01J 3/02](#), [H01J 3/04](#) take precedence){see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/16 .. Mirrors {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/18 .. Electrostatic lenses {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/20 .. Magnetic lenses {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/22 ... using electromagnetic means only {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/24 ... using permanent magnets only {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}

- H01J 3/26 . Arrangements for deflecting ray or beam (circuit arrangements for producing saw-tooth pulses or other deflecting voltages or currents [H03K](#); {[H01J 29/46](#) to [H01J 29/84](#) and [H01J 37/147](#) take precedence})
- H01J 3/28 .. along one straight line or along two perpendicular straight lines {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/30 ... by electric fields only {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/32 ... by magnetic fields only {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/34 .. along a circle, spiral, or rotating radial line {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}

- H01J 3/36 . Arrangements for controlling the ray or beam after passing the main deflection system, e.g. for post-acceleration or post-concentration {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}

- H01J 3/38 . Mounting, supporting, spacing, or insulating electron-optical or ion-optical arrangements {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}
- H01J 3/381 .. { Dispersed generators}
- H01J 3/383 ... { the generators exploiting regenerative energy}
- H01J 3/385 { Solar energy (generation of electric power by conversion of light [H02S](#))}
- H01J 3/386 { Wind energy (wind motors [F03D](#))}
- H01J 3/388 ... { using fuel cells (fuel cells per se [H01M 8/00](#))}

- H01J 3/40 . Traps for removing or diverting unwanted particles, e.g. negative ions, fringing electrons; Arrangements for velocity or mass selection {see provisionally also [H01J 29/46](#) to [H01J 29/84](#)}

- H01J 5/00** **Details relating to vessels or to leading-in conductors common to two or more basic types of discharge tubes or lamps**

- H01J 5/02 . Vessels; Containers; Shields associated therewith; Vacuum locks
- H01J 5/03 .. Arrangements for preventing or mitigating effects of implosion of vessels or containers
- H01J 5/04 .. Vessels or containers characterised by the material thereof ([selection of the material of the coating \[H01J 5/08\]\(#\)](#))
- H01J 5/06 .. Vessels or containers specially adapted for operation at high tension, e.g. by improved potential distribution over surface of vessel
- H01J 5/08 .. provided with coatings on the walls thereof; Selection of materials for the coatings ([luminescent coatings \[H01J 1/62\]\(#\)](#))
- H01J 5/10 ... on internal surfaces
- H01J 5/12 .. Double-wall vessels or containers
- H01J 5/125 ... {with a gas tight space between both walls}
- H01J 5/14 .. Dismountable vessels or containers, e.g. for replacing cathode heater
- H01J 5/16 .. Optical or photographic arrangements structurally combined with the vessel ([luminescent coatings \[H01J 1/62\]\(#\)](#)){see provisionally [H01J 29/84](#)}
- H01J 5/18 .. Windows permeable to X-rays, gamma-rays, or particles

- H01J 5/20 . Seals between parts of vessels

- H01J 5/22 . . Vacuum-tight joints between parts of vessel
- H01J 5/24 . . . between insulating parts of vessel
- H01J 5/26 . . . between insulating and conductive parts of vessel
- H01J 5/28 . . . between conductive parts of vessel
- H01J 5/30 . . . using packing-material, e.g. sealing-liquid or elastic insert

- H01J 5/32 . Seals for leading-in conductors
- H01J 5/34 . . for an individual conductor ([pinched-stem seals H01J 5/38](#); [end-disc seals H01J 5/40](#); [annular seals H01J 5/44](#))
- H01J 5/36 . . . using intermediate part
- H01J 5/38 . . Pinched-stem or analogous seals
- H01J 5/40 . . end-disc seals, e.g. flat header
- H01J 5/42 . . . using intermediate part
- H01J 5/44 . . Annular seals disposed between the ends of the vessel

- H01J 5/46 . Leading-in conductors

- H01J 5/48 . Means forming part of the tube or lamp for the purpose of supporting it ([associated with electrical connecting means H01J 5/50](#))

- H01J 5/50 . Means forming part of the tube or lamps for the purpose of providing electrical connection to it ([construction of connectors H01R](#))
- H01J 5/52 . . directly applied to or forming part of the vessel
- H01J 5/54 . . supported by a separate part, e.g. base
- H01J 5/56 . . . Shape of the separate part
- H01J 5/565 {Bases for circular lamps}
- H01J 5/58 . . . Means for fastening the separate part to the vessel, e.g. by cement
- H01J 5/60 for fastening by mechanical means
- H01J 5/62 . . . Connection of wires protruding from the vessel to connectors carried by the separate part

- H01J 7/00** **Details not provided for in the preceding groups and common to two or more basic types of discharge tubes or lamps**

- H01J 7/02 . Selection of substances for gas fillings; Specified operating pressure or temperature ([radioactive fillings H01J 7/40](#))
- H01J 7/04 . . having one or more carbon compounds as the principal constituent
- H01J 7/06 . . having helium, argon, neon, krypton, or xenon as the principal constituent
- H01J 7/08 . . having a metallic vapour as the principal constituent
- H01J 7/10 . . . mercury vapour
- H01J 7/12 . . . vapour of an alkali metal

- H01J 7/14 . Means for obtaining or maintaining the desired pressure within the vessel
- H01J 7/16 . . Means for permitting pumping during operation of the tube or lamp
- H01J 7/18 . . Means for absorbing or adsorbing gas, e.g. by gettering
- H01J 7/183 . . . {Composition or manufacture of getters}

- H01J 7/186 . . . {Getter supports}
- H01J 7/20 . . . Means for producing, introducing, or replenishing gas or vapour during operation of the tube or lamp
- H01J 7/22 . . . Tubulations therefor, e.g. for exhausting; Closures therefor
- H01J 7/24 . . . Cooling arrangements (for main electrodes [H01J 1/02](#)); Heating arrangements (for main electrodes [H01J 1/02](#)); Means for circulating gas or vapour within the discharge space
- H01J 7/26 . . . by flow of fluid through passages associated with tube or lamp
- H01J 7/28 . . . by latent heat or evaporation of cooling liquid
- H01J 7/30 . . . Igniting arrangements (circuit arrangements [H02M 1/02](#), [H05B](#))
- H01J 7/32 . . . having resistive or capacitative igniter
- H01J 7/34 having resistive igniter only
- H01J 7/36 . . . Igniting by movement of a solid electrode
- H01J 7/38 . . . Igniting by movement of vessel as a whole, e.g. tilting
- H01J 7/40 . . . Igniting by associated radioactive materials or fillings
- H01J 7/42 . . . Means structurally associated with the tube or lamp for indicating defects or previous use
- H01J 7/44 . . . One or more circuit elements structurally associated with the tube or lamp
- H01J 7/46 . . . Structurally associated resonator having distributed inductance and capacitance
- H01J 9/00** . . . **Apparatus or processes specially adapted to the manufacture, { installation, removal, maintenance} of electric discharge tubes, discharge lamps, or parts thereof (manufacture of vessels or containers from metal B21, e.g. [B21D 51/00](#), from glass C03B); Recovery of material from discharge tubes or lamps**
- H01J 9/003 . . . {Auxiliary devices for installing or removing discharge tubes or lamps}
- H01J 9/006 {for fluorescent lamps}
- H01J 9/02 . . . Manufacture of electrodes or electrode systems
- H01J 9/022 {of cold cathodes}
- H01J 9/025 {of field emission cathodes}
- H01J 9/027 {of thin film cathodes}
- H01J 9/04 . . . of thermionic cathodes
- H01J 9/042 {Manufacture, activation of the emissive part}
- H01J 9/045 {Activation of assembled cathode (regeneration [H01J 9/505](#))}
- H01J 9/047 {Cathodes having impregnated bodies ([H01J 9/045](#) takes precedence)}
- H01J 9/06 Machines therefor
- H01J 9/08 Manufacture of heaters for indirectly-heated cathodes
- H01J 9/10 Machines therefor
- H01J 9/12 of photo-emissive cathodes; of secondary-emission electrodes
- H01J 9/125 {of secondary emission electrodes}
- H01J 9/14 of non-emitting electrodes

- H01J 9/142 . . . {of shadow-masks for colour television tubes}
- H01J 9/144 {Mask treatment related to the process of dot deposition during manufacture of luminescent screen}
- H01J 9/146 {Surface treatment, e.g. blackening, coating ([H01J 9/144](#) takes precedence)}
- H01J 9/148 . . . { of electron emission flat panels, e.g. gate electrodes, focusing electrodes or anode electrodes}
- H01J 9/16 . . . Machines for making wire grids
- H01J 9/18 . . Assembling together the component parts of electrode systems
- H01J 9/185 . . . {of flat panel display devices, e.g. by using spacers}

- H01J 9/20 . . Manufacture of screens on or from which an image or pattern is formed, picked up, converted or stored; Applying coatings to the vessel
- H01J 9/205 . . { Applying optical coatings or shielding coatings to the vessel of flat panel displays, e.g. applying filter layers, electromagnetic interference shielding layers, anti-reflection coatings or anti-glare coatings}
- H01J 9/22 . . Applying luminescent coatings
- H01J 9/221 . . . {in continuous layers}
- H01J 9/222 {constituted by coated granules emitting light of different colour}
- H01J 9/223 {by uniformly dispersing of liquid}
- H01J 9/224 {by precipitation}
- H01J 9/225 {by electrostatic or electrophoretic processes}
- H01J 9/227 . . . with luminescent material discontinuously arranged, e.g. in dots or lines
- H01J 9/2271 {by photographic processes (final treatment of shadow-mask prior to or after dot deposition [H01J 9/144](#))}
- H01J 9/2272 {Devices for carrying out the processes, e.g. light houses}
- H01J 9/2273 {Auxiliary lenses and filters}
- H01J 9/2274 {Light sources particularly adapted therefor}
- H01J 9/2275 {including the exposition of a substance responsive to a particular radiation}
- H01J 9/2276 {Development of latent electrostatic images (per se [G03G 15/06](#))}
- H01J 9/2277 {by other processes, e.g. serigraphy, decalcomania}
- H01J 9/2278 {Application of light absorbing material, e.g. between the luminescent areas}
- H01J 9/233 . . Manufacture of photo-electric screens or charge-storage screens {no documents, see [H01J 29/36](#)}

- H01J 9/236 . . Manufacture of magnetic deflecting devices for cathode-ray tubes (manufacturing coils for transformers, inductances, reactors or choke coils [H01F 41/04](#))

- H01J 9/24 . . Manufacture or joining of vessels, leading-in conductors or bases
- H01J 9/241 . . { the vessel being for a flat panel display ([H01J 9/261](#) takes precedence; flat discharge lamps [H01J 9/248](#))}
- H01J 9/242 . . . { Spacers between faceplate and backplate}
- H01J 9/244 . . { specially adapted for cathode ray tubes ([H01J 9/241](#), [H01J 9/26](#) take precedence)}
- H01J 9/245 . . { specially adapted for gas discharge tubes or lamps ([H01J 9/241](#), [H01J 9/26](#) take precedence)}
- H01J 9/247 . . . {specially adapted for gas-discharge lamps}

- H01J 9/248 { the vessel being flat}
- H01J 9/26 .. Sealing together parts of vessels
- H01J 9/261 ... { the vessel being for a flat panel display (for flat discharge lamps [H01J 9/268](#))}
- H01J 9/263 ... { specially adapted for cathode-ray tubes([H01J 9/261](#) takes precedence)}
- H01J 9/265 ... {specially adapted for gas-discharge tubes or lamps ([H01J 9/261](#) takes precedence)}
- H01J 9/266 {specially adapted for gas-discharge lamps}
- H01J 9/268 { the vessel being flat}
- H01J 9/28 .. Manufacture of leading-in conductors
- H01J 9/30 .. Manufacture of bases
- H01J 9/32 .. Sealing leading-in conductors
- H01J 9/323 . . . {Sealing leading-in conductors into a discharge lamp or a gas-filled discharge device (for incandescent lamps [H01K 3/20](#), joining glass to metal [C03C 27/00](#))}
- H01J 9/326 {making pinched-stem or analogous seals}
- H01J 9/34 .. Joining base to vessel
- H01J 9/36 .. Joining connectors to internal electrode system

- H01J 9/38 . Exhausting, degassing, filling, or cleaning vessels
- H01J 9/385 .. Exhausting vessels
- H01J 9/39 .. Degassing vessels
- H01J 9/395 .. Filling vessels

- H01J 9/40 . Closing vessels

- H01J 9/42 . Measurement or testing during manufacture

- H01J 9/44 . Factory adjustment of completed discharge tubes or lamps to comply with desired tolerances
- H01J 9/445 .. {Aging of tubes or lamps, e.g. by "spot knocking" (cathode activation [H01J 9/045](#))}

- H01J 9/46 . Machines having sequentially arranged operating stations
- H01J 9/48 .. with automatic transfer of work-pieces between operating stations

- H01J 9/50 . Repairing or regenerating used or defective discharge tubes or lamps
- H01J 9/505 .. {Regeneration of cathodes (activation [H01J 9/045](#))}

- H01J 9/52 . Recovery of material from discharge tubes or lamps ([H01J 9/50](#) takes precedence)

- H01J 11/00** **Gas-filled discharge tubes with alternating current induction of the discharge, e.g. AC-PDPs [Alternating Current Plasma Display Panels] (circuits or methods for driving PDPs [G09G 3/28](#)); Gas-filled discharge tubes without any main electrode inside the vessel; Gas-filled discharge tubes with at least one main electrode outside the vessel (discharge lamps [H01J 65/00](#){[H01J 61/00](#), [H01J 63/00](#))}**

NOTE

- (1) When classifying in this group, classification is made in all appropriate places.
- (2) In this group, the following term is used with the meaning indicated:

- "main electrode" means any of a sustain electrode, scan electrode or address electrode.

- H01J 11/10 . AC-PDPs with at least one main electrode being out of contact with the plasma
- H01J 11/12 .. with main electrodes provided on both sides of the discharge space
- H01J 11/14 .. with main electrodes provided only on one side of the discharge space
- H01J 11/16 .. with main electrodes provided inside or on the side face of the spacers
- H01J 11/18 .. containing a plurality of independent closed structures for containing the gas, e.g. plasma tube array [PTA] display panels

- H01J 11/20 . Constructional details
- H01J 11/22 .. Electrodes, e.g. special shape, material or configuration
- H01J 11/24 ... Sustain electrodes or scan electrodes
- H01J 11/26 ... Address electrodes
- H01J 11/28 ... Auxiliary electrodes, e.g. priming electrodes or trigger electrodes
- H01J 11/30 ... Floating electrodes
- H01J 11/32 ... Disposition of the electrodes
- H01J 11/34 .. Vessels, containers or parts thereof, e.g. substrates
- H01J 11/36 ... Spacers, barriers, ribs, partitions or the like
- H01J 11/38 ... Dielectric or insulating layers
- H01J 11/40 ... Layers for protecting or enhancing the electron emission, e.g. MgO layers
- H01J 11/42 ... Fluorescent layers
- H01J 11/44 .. Optical arrangements or shielding arrangements, e.g. filters, black matrices, light reflecting means or electromagnetic shielding means
- H01J 11/46 .. Connecting or feeding means, e.g. leading-in conductors
- H01J 11/48 .. Sealing, e.g. seals specially adapted for leading-in conductors
- H01J 11/50 .. Filling, e.g. selection of gas mixture
- H01J 11/52 .. Means for absorbing or adsorbing the gas mixture, e.g. by gettering
- H01J 11/54 .. Means for exhausting the gas

H01J 13/00 **Discharge tubes with liquid-pool cathodes, e.g. metal-vapour rectifying tubes** (lamps [H01J 61/00](#))

- H01J 13/02 . Details
- H01J 13/04 .. Main electrodes; Auxiliary anodes
- H01J 13/06 ... Cathodes
- H01J 13/08 characterised by the material
- H01J 13/10 Containers for the liquid pool; Arrangements or mounting thereof
- H01J 13/12 Positioning or moving the cathode spot on the surface of the pool
- H01J 13/14 Cooling, heating, circulating, filtering, or controlling level of the liquid
- H01J 13/16 ... Anodes; Auxiliary anodes for maintaining the discharge ([screens H01J 13/22](#))

- H01J 13/18 Cooling or heating of anodes
- H01J 13/20 . . Control electrodes, e.g. grid ([for igniting arrangements H01J 13/34](#))
- H01J 13/22 . . Screens, e.g. for preventing or eliminating arcing-back
- H01J 13/24 . . Vessels; Containers
- H01J 13/242 . . . {characterised by the material}
- H01J 13/244 . . . {characterised by the shape}
- H01J 13/246 . . . {Treatment of, or coating on interior parts of vessel}
- H01J 13/248 . . . {Envelope means outside vessel, i.e. screens, reflectors, filters}
- H01J 13/26 . . Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors
- H01J 13/263 . . . {Leading-in conductors to the liquid electrode}
- H01J 13/266 . . . {Leading-in conductors to the anode}
- H01J 13/28 . . Selection of substances for gas filling; Means for obtaining the desired pressure within the tube
- H01J 13/30 . . . Means for permitting pumping during operation of the tube
- H01J 13/32 . . Cooling arrangements; Heating arrangements ([for cathodes H01J 13/14](#); [for anodes H01J 13/18](#))
- H01J 13/34 . . Igniting arrangements ([circuits arrangements H02M 1/02](#))
- H01J 13/36 . . . having resistive or capacitive igniter
- H01J 13/38 having resistive igniter only
- H01J 13/40 . . . Igniting by movement of a solid electrode
- H01J 13/405 {Interrupting contact with liquid cathode}
- H01J 13/42 . . . Igniting by movement of vessel as a whole, e.g. tilting
- H01J 13/44 . . Devices for preventing or eliminating arcing-back ([screens therefor H01J 13/22](#))
- H01J 13/46 . . One or more circuit elements structurally associated with the tube
- H01J 13/48 . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

- H01J 13/50 . Tubes having a single main anode
- H01J 13/52 . . with control by one or more intermediate control electrodes
- H01J 13/54 . . with control by igniter, e.g. single-anode ignitron

- H01J 13/56 . Tubes having two or more main anodes
- H01J 13/58 . . with control by one or more intermediate control electrodes

- H01J 15/00** **Gas-filled discharge tubes with gaseous cathodes, e.g. plasma cathode** ([lamps H01J 61/62](#))

- H01J 15/02 . Details, e.g. electrode, gas filling, shape of vessel
- H01J 15/04 . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

- H01J 17/00** **Gas-filled discharge tubes with solid cathode** ([H01J 25/00](#), [H01J 27/00](#), [H01J 31/00](#) to [H01J 41/00](#){[H01J 11/00](#)} take precedence; [gas or vapour discharge lamps H01J 61/00](#); [gas filled spark gaps H01T](#); [Marx converters H02M 7/26](#) ; tubes for generating potential

differences by charges carried in a gas stream H02N)

- H01J 17/005 . {specially adapted as noise generators (electronic circuits for generation of noise currents or voltages [H03B 29/00](#))}
- H01J 17/02 . Details
- H01J 17/04 .. Electrodes; Screens
- H01J 17/06 ... Cathodes
- H01J 17/063 {Indirectly heated cathodes, e.g. by the discharge itself}
- H01J 17/066 {Cold cathodes}
- H01J 17/08 having mercury or liquid alkali metal deposited on the cathode surface during operation of the tube
- H01J 17/10 ... Anodes
- H01J 17/12 ... Control electrodes
- H01J 17/14 .. Magnetic means for controlling the discharge
- H01J 17/16 .. Vessels; Containers
- H01J 17/18 .. Seals between parts of vessels; Seals for leading-in conductors; leading-in conductors
- H01J 17/183 ... {Seals between parts of vessel}
- H01J 17/186 ... {Seals between leading-in conductors and vessel}
- H01J 17/20 .. Selection of substances for gas fillings; Specified operating pressure or temperature ([radioactive fillings H01J 17/32](#))
- H01J 17/22 .. Means for obtaining or maintaining the desired pressure within the tube
- H01J 17/24 ... Means for absorbing or adsorbing gas, e.g. by gettering
- H01J 17/26 ... Means for producing, introducing, or replenishing gas or vapour during operation of the tube
- H01J 17/28 .. Cooling arrangements
- H01J 17/30 .. Igniting arrangements
- H01J 17/32 ... Igniting by associated radioactive materials or fillings
- H01J 17/325 {Current stabilising tubes, e.g. curpistors}
- H01J 17/34 .. One or more circuit elements structurally associated with the tube
- H01J 17/36 .. Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- H01J 17/38 . Cold-cathode tubes ([TR boxes H01J 17/64](#))
- H01J 17/40 .. with one cathode and one anode, e.g. glow tube, tuning-indicator glow tube, voltage-stabiliser tube, voltage-indicator tube, ([cathode-glow lamps H01J 61/04](#))
- H01J 17/42 ... having one or more probe electrodes, e.g. for potential dividing
- H01J 17/44 ... having one or more control electrodes
- H01J 17/46 for preventing and then permitting ignition but thereafter having no control
- H01J 17/48 .. with more than one cathode or anode, e.g. sequence-discharge tube, counting tube, dekatron
- H01J 17/485 ... { Plasma addressed liquid crystal displays [PALC] }
- H01J 17/49 ... Display panels, e.g. with crossed electrodes { e.g. making use of direct

- gas discharge type indicating arrangements effected by the combination of a number of individual lamps [G09F 9/313](#){ display panels making use of alternating current [H01J11](#))
- H01J 17/491 {with electrodes arranged side by side and substantially in the same plane, e.g. for displaying alphanumeric characters}
 - H01J 17/492 {with crossed electrodes}
 - H01J 17/494 {using sequential transfer of the discharges, e.g. of the self-scan type (addressing circuits therefor [G09G 3/29](#))}
 - H01J 17/495 {display panels using sequential transfer of the discharge along dielectric storage elements}
 - H01J 17/497 {for several colours}
 - H01J 17/498 {with a gas discharge space and a post acceleration space for electrons}

 - H01J 17/50 . Thermionic-cathode tubes ([TR boxes H01J 17/64](#))
 - H01J 17/52 . . with one cathode and one anode
 - H01J 17/54 . . . having one or more control electrodes
 - H01J 17/56 for preventing and then permitting ignition, but thereafter having no control
 - H01J 17/58 . . with more than one cathode or anode
 - H01J 17/60 . . . the discharge paths priming each other in a predetermined sequence, e.g. counting tube
 - H01J 17/62 . . . with independent discharge paths controlled by intermediate electrodes, e.g. polyphase rectifier

 - H01J 17/64 . Tubes specially designed for switching or modulating in a waveguide, e.g. TR box

H01J 19/00 **Details of vacuum tubes of the types covered by group [H01J 21/00](#)**

- H01J 19/02 . Electron-emitting electrodes; Cathodes
- H01J 19/04 . . Thermionic cathodes
- H01J 19/06 . . . characterised by the material
- H01J 19/062 with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material
- H01J 19/064 with other metal oxides as an emissive material
- H01J 19/066 with metals or alloys as an emissive material
- H01J 19/068 with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material
- H01J 19/08 . . . Cathodes heated directly by an electric current
- H01J 19/10 . . . characterised by the shape
- H01J 19/12 Supports; Vibration-damping arrangements
- H01J 19/14 . . . Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
- H01J 19/16 Heaters ([filaments for incandescent lamps H01K 1/02](#))
- H01J 19/18 Insulating layer or body located between heater and emissive material
- H01J 19/20 Supports for the emissive material
- H01J 19/22 Dispenser-type cathodes, e.g. L-cathode
- H01J 19/24 . . Cold cathodes, e.g. field-emissive cathode

- H01J 19/28 . Non-electron-emitting electrodes; Screens
- H01J 19/30 .. characterised by the material
- H01J 19/32 .. Anodes
- H01J 19/34 ... forming part of the envelope
- H01J 19/36 ... Cooling of anodes
- H01J 19/38 .. Control electrodes, e.g. grid
- H01J 19/40 .. Screens for shielding ([screens acting as control electrodes H01J 19/38](#))

- H01J 19/42 . Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies
- H01J 19/44 .. Insulation between electrodes or supports within the vacuum space ([leading-in conductors H01J 19/62](#))
- H01J 19/46 .. Mountings for the electrode assembly as a whole
- H01J 19/48 .. Mountings for individual electrodes ([for directly-heated cathodes H01J 19/12](#))
- H01J 19/50 .. Spacing members extending to the envelope
- H01J 19/52 ... without fixed connection between spacing member and envelope

- H01J 19/54 . Vessels; Containers; Shield associated therewith
- H01J 19/56 .. characterised by the material of the vessel or container
- H01J 19/57 .. provided with coatings on the walls thereof; Selection of materials for the coatings

- H01J 19/58 . Seals between parts of vessels

- H01J 19/60 . Seals for leading-in conductors

- H01J 19/62 . Leading-in conductors

- H01J 19/64 . Means forming part of the tube for the purpose supporting it ([associated with electrical connecting means H01J 19/66](#))

- H01J 19/66 . Means forming part of the tube for the purpose of providing electrical connection to it ([construction of connectors H01R](#)){no documents, see [H01J 5/46](#) to [H01J 5/62](#)}

- H01J 19/68 . Specified gas introduced into the tube at low pressure, e.g. for reducing or influencing space charge

- H01J 19/70 . Means for obtaining or maintaining the vacuum, e.g. by gettering
- H01J 19/72 .. Tubulations therefor, e.g. for exhausting; Closures therefor

- H01J 19/74 . Cooling arrangements ([cooling of anodes H01J 19/36](#))

- H01J 19/76 . Means structurally associated with the tube for indicating defects or previous use

- H01J 19/78 . One or more circuit elements structurally associated with the tube
- H01J 19/80 .. Structurally associated resonator having distributed inductance and capacitance

- H01J 19/82 . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

H01J 21/00 **Vacuum tubes** ([H01J 25/00](#), [H01J 31/00](#) to [H01J 37/00](#), [H01J 43/00](#) take precedence; details of vacuum tubes [H01J 19/00](#); cathode ray or electron stream lamps [H01J 63/00](#))

- H01J 21/02 . Tubes with a single discharge path
- H01J 21/04 .. without control means, i.e. diodes
- H01J 21/06 .. having electrostatic control means only
- H01J 21/065 ... {Devices for short wave tubes}
- H01J 21/08 ... with movable electrode or electrodes
- H01J 21/10 ... with one or more immovable internal control electrodes, e.g. triode, pentode, octode
- H01J 21/105 {with micro-engineered cathode and control electrodes, e.g. Spindt-type}
- H01J 21/12 Tubes with variable amplification factor
- H01J 21/14 Tubes with means for concentrating the electron stream, e.g. beam tetrode
- H01J 21/16 ... with external electrostatic control means and with or without internal control electrodes
- H01J 21/18 .. having magnetic control means; having both magnetic and electro-static control means
- H01J 21/20 . Tubes with more than one discharge path; Multiple tubes, e.g. double diode, triode-hexode ([secondary-emission tubes](#), [electron-multiplier tubes H01J 43/00](#))
- H01J 21/22 .. with movable electrode or electrodes
- H01J 21/24 .. with variable amplification factor
- H01J 21/26 .. with means for concentrating the electron stream
- H01J 21/34 . Tubes with electrode system arranged or dimensioned so as to eliminate transit-time effect ([with flat electrodes H01J 21/36](#))
- H01J 21/36 . Tubes with flat electrodes, e.g. disc electrode

H01J 23/00 **Details of transit-time tubes of the types covered by group [H01J 25/00](#)**

- H01J 23/005 . {Cooling methods or arrangements ([H01J 23/033](#) takes precedence)}
- H01J 23/02 . Electrodes; Magnetic control means; Screens ([associated with resonator or delay system H01J 23/16](#))
- H01J 23/027 .. Collectors
- H01J 23/0275 ... {Multistage collectors}
- H01J 23/033 ... Collector cooling devices
- H01J 23/04 .. Cathodes
- H01J 23/05 ... having a cylindrical emissive surface, e.g. cathodes for magnetrons
- H01J 23/06 .. Electron or ion guns
- H01J 23/065 ... producing a solid cylindrical beam ([H01J 23/075](#) takes precedence)
- H01J 23/07 ... producing a hollow cylindrical beam ([H01J 23/075](#) takes precedence)
- H01J 23/075 ... Magnetron injection guns
- H01J 23/08 .. Focusing arrangements, e.g. for concentrating stream of electrons, for preventing

- spreading of stream
- H01J 23/083 . . . Electrostatic focusing arrangements
- H01J 23/087 . . . Magnetic focusing arrangements
- H01J 23/0873 {with at least one axial-field reversal along the interaction space, e.g. P.P.M. focusing}
- H01J 23/0876 {with arrangements improving the linearity and homogeneity of the axial field, e.g. field straightener}
- H01J 23/09 . . Electric system for directing or deflecting the discharge along a desired path, e.g. E-type ([focusing arrangements H01J 23/08](#))
- H01J 23/10 . . Magnet systems for directing or deflecting the discharge along a desired path, e.g. a spiral path ([magnetic focusing arrangements H01J 23/08](#))
- H01J 23/11 . . Means for reducing noise ([in electron or ion gun H01J 23/06](#))
- H01J 23/12 . Vessels; Containers
- H01J 23/14 . Leading-in arrangements; Seals therefor
- H01J 23/15 . . Means for preventing wave energy leakage structurally associated with tube leading-in arrangements, e.g. filters, chokes, attenuating devices
- H01J 23/16 . Circuit elements, having distributed capacitance and inductance, structurally associated with the tube and interacting with the discharge ([circuit elements, having distributed capacitance and inductance, in general H01P](#))
- H01J 23/165 . . {Manufacturing processes or apparatus therefore}
- H01J 23/18 . . Resonators
- H01J 23/20 . . . Cavity resonators; Adjustment or tuning thereof
- H01J 23/207 Tuning of single resonator
- H01J 23/213 Simultaneous tuning of more than one resonator, e.g. resonant cavities of a magnetron
- H01J 23/22 . . . Connections between resonators, e.g. strapping for connecting resonators of a magnetron
- H01J 23/24 . . Slow-wave structures, {e.g. delay systems}
- H01J 23/26 . . . Helical slow-wave structures; Adjustment therefor
- H01J 23/27 Helix-derived slow-wave structures
- H01J 23/28 . . . Interdigital slow-wave structures; Adjustment therefor
- H01J 23/30 . . . Damping arrangements associated with slow-wave structures, e.g. for suppression of unwanted oscillations
- H01J 23/34 . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- H01J 23/36 . Coupling devices having distributed capacitance and inductance, structurally associated with the tube, for introducing or removing wave energy
- H01J 23/38 . . to or from the discharge
- H01J 23/40 . . to or from the interaction circuit
- H01J 23/42 . . . the interaction circuit being a helix or a helix-derived slow-wave structure ([H01J 23/44 to H01J 23/48 take precedence](#))
- H01J 23/44 . . . Rod-type coupling devices ([H01J 23/46, H01J 23/48, H01J 23/54 take precedence](#))

- H01J 23/46 . . . Loop coupling devices
- H01J 23/48 . . . for linking interaction circuit with coaxial lines; Devices of the coupled helices type ([H01J 23/46](#) takes precedence)
- H01J 23/50 the interaction circuit being a helix or derived from a helix ([H01J 23/52](#) takes precedence)
- H01J 23/52 the coupled helices being disposed coaxially around one another
- H01J 23/54 . . Filtering devices preventing unwanted frequencies or modes to be coupled to, or out of, the interaction circuit; Prevention of high frequency leakage in the environment

- H01J 25/00** **Transit-time tubes, e.g. Klystrons, travelling-wave tubes, magnetrons** ([details of transit-time tubes H01J 23/00](#); [particle accelerators H05H](#))

- H01J 25/005 . {Gas-filled transit-time tubes}
- H01J 25/02 . Tubes with electron stream modulated in velocity or density in a modulator zone and thereafter giving up energy in an inducing zone, the zones being associated with one or more resonators ([tubes in which a travelling-wave is simulated at spaced gaps H01J 25/34](#))
- H01J 25/025 . . {with an electron stream following a helical path}
- H01J 25/04 . . Tubes having one or more resonators, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly density modulation, e.g. Heaff tube
- H01J 25/06 . . Tubes having only one resonator, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly velocity modulation, e.g. Lüdi-Klystron
- H01J 25/08 . . . with electron stream perpendicular to the axis of the resonator
- H01J 25/10 . . Klystrons, i.e. tubes having two or more resonators, without reflection of the electron stream, and in which the stream is modulated mainly by velocity in the zone of the input resonator
- H01J 25/11 . . . Extended interaction Klystrons
- H01J 25/12 . . . with pencil-like electron stream in the axis of the resonators
- H01J 25/14 . . . with tube-like electron stream coaxial with the axis of the resonators
- H01J 25/16 . . . with pencil-like electron stream perpendicular to the axis of the resonators
- H01J 25/18 . . . with radial or disc-like electron stream perpendicular to the axis of the resonators
- H01J 25/20 . . . having special arrangements in the space between resonators, e.g. resistive-wall amplifier tube, space-charge amplifier tube, velocity-jump tube
- H01J 25/22 . . Reflex Klystrons, i.e. tubes having one or more resonators, with a single reflection of the electron stream, and in which the stream is modulated mainly by velocity in the modulator zone
- H01J 25/24 . . . in which the electron stream is in the axis of the resonator or resonators and is pencil-like before reflection
- H01J 25/26 . . . in which the electron stream is coaxial with the axis of the resonator or resonators and is tube-like before reflection
- H01J 25/28 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is pencil-like before reflection
- H01J 25/30 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is radial or disc-like before reflection

- H01J 25/32 . . Tubes with plural reflection, e.g. Coeterier tube
- H01J 25/34 . Travelling-wave tubes; Tubes in which a travelling wave is simulated at spaced gaps
- H01J 25/36 . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and without magnet system producing an H-field crossing the E-field
 - H01J 25/38 . . . the forward travelling wave being utilised
 - H01J 25/40 . . . the backward travelling wave being utilised
- H01J 25/42 . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and with a magnet system producing an H-field crossing the E-field (with travelling wave moving completely around the electron space [H01J 25/50](#))
 - H01J 25/44 . . . the forward travelling wave being utilised
 - H01J 25/46 . . . the backward travelling wave being utilised
- H01J 25/48 . . Tubes in which two electron streams of different velocities interact with one another, e.g. electron-wave tube
- H01J 25/49 . . Tubes using the parametric principle, e.g. for parametric amplification
- H01J 25/50 . Magnetrons, i.e. tubes with a magnet system producing an H-field crossing the E-field (with travelling wave not moving completely around the electron space [H01J 25/42](#); functioning with plural reflection or with reversed cyclotron action [H01J 25/62](#), [H01J 25/64](#))
 - H01J 25/52 . . with an electron space having a shape that does not prevent any electron from moving completely around the cathode or guide electrode
 - H01J 25/54 . . . having only one cavity or other resonator, e.g. neutrode tube (having a composite resonator [H01J 25/58](#))
 - H01J 25/55 Coaxial cavity magnetrons
 - H01J 25/56 with interdigital arrangements of anodes, e.g. turbator tube
 - H01J 25/58 . . . having a number of resonators; having a composite resonator, e.g. a helix
 - H01J 25/587 Multi-cavity magnetrons
 - H01J 25/593 Rising-sun magnetrons
 - H01J 25/60 . . with an electron space having a shape that prevents any electron from moving completely around the cathode or guide electrode; Linear magnetrons
- H01J 25/61 . Hybrid tubes, i.e. tubes comprising a klystron section and a travelling-wave section
- H01J 25/62 . Strophotrons, i.e. tubes with H-field crossing the E-field and functioning with plural reflection
- H01J 25/64 . Turbine tubes, i.e. tubes with H-field crossing the E-field and functioning with reversed cyclotron action
- H01J 25/66 . Tubes with electron stream crossing itself and thereby interacting or interfering with itself
- H01J 25/68 . Tubes specially designed to act as oscillator with positive grid and retarding field, e.g. for Barkhausen-Kurz oscillators (with secondary emission [H01J 25/76](#))
 - H01J 25/70 . . with resonator having distributed inductance with capacitance, e.g. Pintsch tube
 - H01J 25/72 . . in which a standing wave or a considerable part thereof is produced along an electrode, e.g. Clavier tube (with resonator having distributed inductance and

capacitance [H01J 25/70](#))

[H01J 25/74](#) . Tubes specially designed to act as transit-time diode oscillators, e.g. monotron ([with secondary emission H01J 25/76](#))

[H01J 25/76](#) . Dynamic electron-multiplier tubes, e.g. Farnsworth multiplier tube, multipactor

[H01J 25/78](#) . Tubes with electron stream modulated by deflection in a resonator

[H01J 27/00](#) **Ion beam tubes** ([H01J 25/00](#), [H01J 33/00](#), [H01J 37/00](#) take precedence; particle accelerators [H05H](#))

[H01J 27/02](#) . Ion sources; Ion guns ({ for examination or processing discharge tubes [H01J 37/08](#); ion sources, ion guns for particle spectrometer or separator tubes [H01J 49/10](#); ion propulsion [F03H 1/00](#)); arrangements for handling particles, e.g. focusing, { charge exchanging, polarising}, [G21K 1/00](#); generating ions to be introduced into non-enclosed gases [H01T 23/00](#); generating plasma [H05H 1/24](#))

[H01J 27/022](#) .. {Details}

[H01J 27/024](#) ... { Extraction optics, e.g. grids}

[H01J 27/026](#) .. { Cluster ion sources}

[H01J 27/028](#) .. {Negative ion sources}

[H01J 27/04](#) .. using reflex discharge, e.g. Penning ion sources {[Electron bombardment ion sources H01J 27/08](#)}

[H01J 27/06](#) ... without applied magnetic field

[H01J 27/08](#) .. using arc discharge

[H01J 27/10](#) ... Duoplasmatrons ([for use in particle accelerators H05H 7/00](#)){[H05H 7/00](#) not used therefor; Duopigatrons}

[H01J 27/12](#) provided with an expansion cup

[H01J 27/14](#) ... Other arc discharge ion sources using an applied magnetic field

[H01J 27/143](#) { Hall-effect ion sources with closed electron drift}

[H01J 27/146](#) { End-Hall type ion sources, wherein the magnetic field confines the electrons in a central cylinder}

[H01J 27/16](#) .. using high-frequency excitation, e.g. microwave excitation

[H01J 27/18](#) ... with an applied axial magnetic field

[H01J 27/20](#) .. using particle {beam} bombardment, e.g. ionisers

[H01J 27/205](#) ... { with electrons, e.g. electron impact ionisation, electron attachment}

[H01J 27/22](#) ... Metal ion sources

[H01J 27/24](#) .. using photo-ionisation, e.g. using laser beam

[H01J 27/26](#) .. using surface ionisation, e.g. field effect ion sources, thermionic ion sources ([H01J 27/20](#), [H01J 27/24](#) take precedence)

[H01J 29/00](#) **Details of cathode-ray tubes or of electron-beam tubes of the types covered by group [H01J 31/00](#)**

[H01J 29/003](#) . {Arrangements for eliminating unwanted electromagnetic effects, e.g. demagnetisation arrangements, shielding coils ([H01J 29/06](#), [H01J 29/867](#) take precedence; demagnetisation in general [H01F 13/00](#); circuit arrangements therefor [H04N 9/29](#);

screening of apparatus against electric or magnetic fields [H05K 9/00](#)}}

- H01J 29/006 . {Arrangements for eliminating unwanted temperature effects}
- H01J 29/02 . Electrodes; Screens; Mounting, supporting, spacing or insulating thereof
- H01J 29/021 .. {arrangements for eliminating interferences in the tube ([H01J 29/484](#) takes precedence)}
- H01J 29/023 .. {secondary-electron emitting electrode arrangements (secondary-emission tubes [H01J 43/00](#))}
- H01J 29/025 .. {Mounting or supporting arrangements for grids ([H01J 29/028](#) takes precedence)}
- H01J 29/026 .. {Mounting or supporting arrangements for charge storage screens not deposited on the frontplate}
- H01J 29/028 .. { Mounting or supporting arrangements for flat panel cathode ray tubes, e.g. spacers particularly relating to electrodes}
- H01J 29/04 .. Cathodes ([electron guns H01J 29/48](#))
- H01J 29/06 .. Screens for shielding; Masks interposed in the electron stream
- H01J 29/07 ... Shadow masks for colour television tubes
- H01J 29/073 {Mounting arrangements associated with shadow masks}
- H01J 29/076 {characterised by the shape or distribution of beam-passing apertures}
- H01J 29/08 .. Electrodes intimately associated with a screen on or from which an image or pattern is formed, picked up, converted, or stored, e.g. backing-plate for storage tube, for collecting secondary electrons ([arrangements for colour switching H01J 29/80](#))
- H01J 29/085 ... {Anode plates, e.g. for screens of flat panel displays}
- H01J 29/10 .. Screens on or from which an image or pattern is formed, picked up, converted or stored
- H01J 29/12 ... acting as light valves by shutter operation, e.g. for eidophor
- H01J 29/14 ... acting by discoloration, e.g. halide screen
- H01J 29/16 ... Incandescent screens
- H01J 29/18 ... Luminescent screens
- H01J 29/182 {acting upon the lighting-up of the luminescent material other than by the composition of the luminescent material, e.g. by infra red or UV radiation, heating or electric fields}
- H01J 29/185 {measures against halo-phenomena}
- H01J 29/187 {screens with more than one luminescent material (as mixtures for the treatment of the screens)(for several superimposed luminescent layers [H01J 29/26](#); for adjacent dots or lines of different luminescent material [H01J 29/32](#))}
- H01J 29/20 characterised by the luminescent material {for luminescent screens for X-ray purposes [G21K 4/00](#)}
- H01J 29/22 characterised by the binder or adhesive for securing the luminescent material to its support, e.g. vessel
- H01J 29/225 {photosensitive adhesive}
- H01J 29/24 Supports for luminescent material
- H01J 29/26 with superimposed luminescent layers
- H01J 29/28 with protective, conductive or reflective layers

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| H01J 29/30 | | with luminescent material discontinuously arranged, e.g. in dots, in lines |
| H01J 29/32 | ..... | with adjacent dots or lines of different luminescent material, e.g. for colour television |
| H01J 29/322 | ..... | {with adjacent dots} |
| H01J 29/325 | ..... | {with adjacent lines} |
| H01J 29/327 | ..... | { Black matrix materials} |
| H01J 29/34 | .... | provided with permanent marks or references |
| H01J 29/36 | ... | Photoelectric screens; Charge-storage screens |
| H01J 29/38 | .... | not using charge storage, e.g. photo-emissive screen, extended cathode {(electrodes using photo-emission in general H01J 1/34)} |
| H01J 29/385 | ..... | {Photocathodes comprising a layer which modified the wave length of impinging radiation (luminescent layers sensitive to UV and X-rays C09K 11/00 , G21K 4/00)} |
| H01J 29/39 | .... | Charge-storage screens {(H01J 29/395 takes precedence)} |
| H01J 29/395 | ..... | {charge-storage grids exhibiting triode effect} |
| H01J 29/41 | ..... | using secondary emission, e.g. for supericonoscope {(electrodes using secondary emission in general H01J 1/32 ; secondary emission tubes H01J 43/00)} |
| H01J 29/413 | ..... | {for writing and reading of charge pattern on opposite sides of the target, e.g. for superorthicon} |
| H01J 29/416 | ..... | {with a matrix of electrical conductors traversing the target} |
| H01J 29/43 | ..... | using photo-emissive mosaic, e.g. for orthicon, for iconoscope |
| H01J 29/435 | ..... | {with a matrix of conductors traversing the target} |
| H01J 29/44 | ..... | exhibiting internal electric effects caused by particle radiation, e.g. bombardment-induced conductivity {(particle detectors exhibiting internal electric effects G01T 1/26)} |
| H01J 29/45 | ..... | exhibiting internal electric effects caused by electromagnetic radiation, e.g. photo-conductive screen, photo-dielectric screen, photovoltaic screen {photoconductive layers for electrography G03G 5/00 } |
| H01J 29/451 | ..... | {with photosensitive junctions} |
| H01J 29/453 | ..... | {provided with diode arrays} |
| H01J 29/455 | ..... | {formed on a silicon substrate} |
| H01J 29/456 | ..... | {exhibiting no discontinuities, e.g. consisting of uniform layers} |
| H01J 29/458 | ..... | {pyroelectrical targets; targets for infra-red or ultra-violet or X-ray radiations} |
| H01J 29/46 | . | Arrangements of electrodes and associated parts for generating or controlling the ray or beam, e.g. electron-optical arrangement {(transit time tubes H01J 23/00 , H01J 25/00 ; X-ray tubes H01J 35/00 ; beam tubes for examining ions, e.g. electron or ion microscopes, or processing of objects or materials e.g. electron or ion beam tubes H01J 37/04 ; electron multipliers H01J 43/04 ; handling of radiation or particles, e.g. focusing, deviating, not otherwise provided for G21K 1/00)} |
| H01J 29/462 | .. | {arrangements for interrupting the beam during inoperative periods} |
| H01J 29/465 | .. | {for simultaneous focalisation and deflection of ray or beam} |
| H01J 29/467 | .. | {Control electrodes for flat display tubes, e.g. of the type covered by group H01J 31/123 } |

NOTE

[H01J 29/48](#) to [H01J 29/51](#) take precedence over groups [H01J 29/52](#) to [H01J 29/68](#).

- H01J 29/48 .. Electron guns
- H01J 29/481 ... {Electron guns using field-emission, photo-emission, or secondary-emission electron source}
- H01J 29/482 ... {Electron guns using electron multiplication}
- H01J 29/484 ... {Eliminating deleterious effects due to thermal effects, electrical or magnetic fields; Preventing unwanted emission ([H01J 29/481](#) and [H01J 29/482](#) take precedence)}
- H01J 29/485 ... {Construction of the gun or of parts thereof ([H01J 29/481](#), [H01J 29/482](#), [H01J 29/484](#) and [H01J 29/487](#) take precedence)}
- H01J 29/487 ... {Replacing parts of the gun; Relative adjustment of the electrodes ([H01J 29/481](#) and [H01J 29/482](#) take precedence; vacuum locks [H01J 29/865](#))}
- H01J 29/488 ... {Schematic arrangements of the electrodes for beam forming; Place and form of the electrodes}
- H01J 29/50 ... Two or more guns in a single vacuum space, e.g. for plural-ray tube ([H01J 29/51](#) takes precedence)
- H01J 29/503 {Three or more guns, the axes of which lay in a common plane}
- H01J 29/506 {guns in delta or circular configuration}
- H01J 29/51 ... Arrangements for controlling convergence of a plurality of beams {by means of electric field only}
- H01J 29/52 .. Arrangements for controlling intensity of ray or beam, e.g. for modulation ({[H01J 29/467](#) takes precedence})
- H01J 29/525 ... {Digitally controlled systems, e.g. Digisplay}
- H01J 29/54 .. Arrangements for centring ray or beam ({[H01J 29/467](#) takes precedence})
- H01J 29/56 .. Arrangements for controlling cross-section of ray or beam; Arrangements for correcting aberration of beam, e.g. due to lenses ({[H01J 29/467](#) takes precedence})
- H01J 29/563 ... {for controlling cross-section}
- H01J 29/566 ... {for correcting aberration}
- H01J 29/58 .. Arrangements for focusing or reflecting ray or beam({[H01J 29/467](#) ,[H01J 29/585](#) take precedence})
- H01J 29/585 ... {in which the transit time of the electrons has to be taken into account}
- H01J 29/60 ... Mirrors
- H01J 29/62 ... Electrostatic lenses
- H01J 29/622 {producing fields exhibiting symmetry of revolution}
- H01J 29/624 {co-operating with or closely associated to an electron gun}
- H01J 29/626 {producing fields exhibiting periodic axial symmetry, e.g. multipolar fields}
- H01J 29/628 {co-operating with or closely associated to an electron gun}
- H01J 29/64 ... Magnetic lenses
- H01J 29/66 using electromagnetic means only
- H01J 29/68 using permanent magnets only
- H01J 29/70 .. Arrangements for deflecting ray or beam ({[H01J 29/467](#), [H01J 29/525](#), [H01J 29/701](#), [H01J 29/708](#) take precedence}; circuit arrangements for producing

- saw-tooth pulses or other deflecting voltages or currents [H03K](#))
- H01J 29/701 . . . {Systems for correcting deviation or convergence of a plurality of beams by means of magnetic fields at least}
 - H01J 29/702 {Convergence correction arrangements therefor}
 - H01J 29/703 {Static convergence systems}
 - H01J 29/705 {Dynamic convergence systems}
 - H01J 29/706 {Deviation correction devices, i.e. having the same action on each beam}
 - H01J 29/707 {Arrangements intimately associated with parts of the gun and co-operating with external magnetic excitation devices}
 - H01J 29/708 . . . {in which the transit time of the electrons has to be taken into account}
 - H01J 29/72 . . . along one straight line or along two perpendicular straight lines
 - H01J 29/74 Deflecting by electric fields only
 - H01J 29/76 Deflecting by magnetic fields only
 - H01J 29/762 {using saddle coils or printed windings (coils per se [H01F](#))}
 - H01J 29/764 {using toroidal windings}
 - H01J 29/766 {using a combination of saddle coils and toroidal windings}
 - H01J 29/768 {using printed windings (printed windings in general [H01F 27/2804](#); manufacturing printed coils per se [H01F 41/04](#); printed circuits and apparatus or processes for manufacturing printed circuits in general [H05K 1/00](#), e.g. [H05K 1/16](#), and [H05K 3/00](#))}
 - H01J 29/78 . . . along a circle, spiral or rotating radial line, e.g. for radar display
 - H01J 29/80 . . . Arrangements for controlling the ray or beam after passing the main deflection system, e.g. for post-acceleration or post-concentration, for colour switching ([H01J 29/701](#) takes precedence)}
 - H01J 29/803 . . . {for post-acceleration or post-deflection, e.g. for colour switching}
 - H01J 29/806 {Electron lens mosaics, e.g. fly`s eye lenses, colour selection lenses}
 - H01J 29/81 . . . using shadow masks (shadow masks per se [H01J 29/07](#))
 - H01J 29/82 . . . Mounting, supporting, spacing, or insulating electron-optical or ion-optical arrangements
 - H01J 29/823 . . . {around the neck of the tube}
 - H01J 29/826 {Deflection arrangements}
 - H01J 29/84 . . . Traps for removing or diverting unwanted particles, e.g. negative ions, fringing electrons; Arrangements for velocity or mass selection (particle spectrometer or separator tubes [H01J 49/00](#))
 - H01J 29/845 . . . {by means of magnetic systems}
 - H01J 29/86 . . . Vessels; Containers; Vacuum locks
 - H01J 29/861 . . . {Vessels or containers characterised by the form or the structure thereof}
 - H01J 29/862 { of flat panel cathode ray tubes}
 - H01J 29/863 . . . {Vessels or containers characterised by the material thereof}
 - H01J 29/864 . . . { Spacers between faceplate and backplate of flat panel cathode ray tubes}
 - H01J 29/865 . . . {Vacuum locks (for tubes for examining or processing of objects or materials e.g. electron microscopes [H01J 37/18](#))}
 - H01J 29/866 {Devices for introducing a recording support into the vessel}
 - H01J 29/867 . . . {Means associated with the outside of the vessel for shielding, e.g. magnetic

- shields (screens for shielding inside the vessel [H01J 29/06](#); magnetic shielding in general [H05K 9/00](#))
- H01J 29/868 . . . {Screens covering the input or output face of the vessel, e.g. transparent anti-static coatings, X-ray absorbing layers}
 - H01J 29/87 . . Arrangements for preventing or limiting effects of implosion of vessels or containers
 - H01J 29/88 . . provided with coatings on the walls thereof; Selection of materials for the coatings ({[H01J 29/868](#) and [H01J 29/89](#) take precedence}; luminescent screens [H01J 29/18](#))
 - H01J 29/89 . . Optical or photographic arrangements structurally combined {or co-operating} with the vessel {([H01J 29/866](#) and [H01J 29/868](#) take precedence)}
 - H01J 29/892 . . . {using fibre optics}
 - H01J 29/894 . . . {Arrangements combined with the vessel for the purpose of image projection on a screen (projection arrangements for image reproduction, e.g. using eidophor [H04N 5/74](#))}
 - H01J 29/896 . . . {Anti-reflection means, e.g. eliminating glare due to ambient light}
 - H01J 29/898 . . . {Spectral filters}
 - H01J 29/90 . Leading-in arrangements; Seals therefor
 - H01J 29/92 . Means forming part of the tube for the purpose of providing electrical connection to it (construction of connectors [H01R](#))
 - H01J 29/925 . . {High voltage anode feedthrough connectors for display tubes}
 - H01J 29/94 . Selection of substances for gas fillings; Means for obtaining or maintaining the desired pressure within the tube e.g. by gettering {(exhausting, degassing, gettering of electric discharge tubes in general [H01J 9/38](#))}
 - H01J 29/96 . One or more circuit elements structurally associated with the tube
 - H01J 29/98 . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- H01J 31/00** **Cathode ray tubes; Electron beam tubes** ([H01J 25/00](#), [H01J 35/00](#), [H01J 37/00](#) take precedence; cathode ray or electron stream lamps [H01J 63/00](#); details of cathode ray tubes or of electron beam tubes [H01J 29/00](#))
- H01J 31/02 . having one or more output electrodes which may be impacted selectively by the ray or beam, and onto, from, or over which the ray or beam may be deflected or de-focused {pulse counting circuits therewith [H03K 29/02](#)}
 - H01J 31/04 . . with only one or two output electrodes {with only two electrically independant groups or electrodes}
 - H01J 31/06 . . with more than two output electrodes, e.g. for multiple switching or counting
 - H01J 31/065 . . . {for electrography or electrophotography, for transferring a charge pattern through the faceplate (leading-in arrangements [H01J 29/90](#); Lenard tubes [H01J 33/00](#); electrography or electrophotography per se [G03C](#))}
 - H01J 31/08 . having a screen on or from which an image or pattern is formed, picked up, converted, or stored
 - H01J 31/10 . . Image or pattern display tubes, i.e. having electrical input and optical output; Flying-spot tubes for scanning purposes

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| H01J 31/12 | ... | with luminescent screen |
| H01J 31/121 | | {tubes for oscillography (colour display tubes H01J 31/20 ; cathode ray oscillography G01R 13/20)} |
| H01J 31/122 | .... | {Direct viewing storage tubes without storage grid (with storage grid H01J 31/18)} |
| H01J 31/123 | .... | {Flat display tubes} |
| H01J 31/124 | ..... | {using electron beam scanning} |
| H01J 31/125 | ..... | {provided with control means permitting the electron beam to reach selected parts of the screen, e.g. digital selection} |
| H01J 31/126 | ..... | {using line sources} |
| H01J 31/127 | ..... | {using large area or array sources, i.e. essentially a source for each pixel group} |
| H01J 31/128 | .... | {provided with control means permitting the electron beam to reach selected parts of the screen, e.g. digitally controlled display tubes (H01J 31/123 takes precedence)} |
| H01J 31/14 | .... | Magic-eye or analogous tuning indicators {(mounting of visual indicators in a radio set H03J 1/04 ; circuits for timing indicators H03J 3/14)} |
| H01J 31/15 | .... | with ray or beam selectively directed to luminescent anode segments {(printing by application of radiation B41J 2/447)} |
| H01J 31/16 | .... | with mask carrying a number of selectively displayable signs, e.g. charactron, numeroscope {(tubes with a mask carrying a matrix of openings, a selection of which permits a sign to be displayed H01J 31/12L)} |
| H01J 31/18 | .... | with image written by a ray or beam on a grid-like charge-accumulating screen, and with a ray or beam passing through and influenced by this screen before striking the luminescent screen, e.g. direct-view storage tube {(charge storage grids exhibiting triode effect H01J 29/395)} |
| H01J 31/20 | ... | for displaying images or patterns in two or more colours {(circuits for colour television H04N 9/16 to H04N 9/28)} |
| H01J 31/201 | .... | {using a colour-selection electrode} |
| H01J 31/203 | ..... | {with more than one electron beam} |
| H01J 31/205 | ..... | {with three electron beams in delta configuration} |
| H01J 31/206 | ..... | {with three coplanar electron beams} |
| H01J 31/208 | .... | {using variable penetration depth of the electron beam in the luminescent layer, e.g. penetrons} |
| H01J 31/22 | ... | for stereoscopic displays |
| H01J 31/24 | ... | with screen acting as light valve by shutter operation, e.g. eidophor {(projection arrangements for image reproduction, e.g. using eidophor H04N 5/74)} |
| H01J 31/26 | .. | Image pick-up tubes having an input of visible light and electric output (tubes without defined electron beams and having a light ray scanning photo-emissive screen H01J 40/20) |
| H01J 31/265 | ... | {with light spot scanning} |
| H01J 31/28 | ... | with electron ray scanning the image screen { H01J 31/283 , H01J 31/286 take precedence} |
| H01J 31/283 | .... | {with a target comprising semiconductor junctions} |
| H01J 31/286 | .... | {correlater tubes} |
| H01J 31/30 | .... | having regulation of screen potential at anode potential, e.g. iconoscope |
| H01J 31/32 | | Tubes with image amplification section, e.g. image-iconoscope, supericonoscope |

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| H01J 31/34 | | having regulation of screen potential at cathode potential, e.g. orthicon |
| H01J 31/36 | ..... | Tubes with image amplification section, e.g. image-orthicon |
| H01J 31/38 | ..... | Tubes with photoconductive screen, e.g. vidicon |
| H01J 31/40 | .... | having grid-like image screen through which the electron ray passes and by which the ray is influenced before striking the output electrode, i.e. having "triode action" |
| H01J 31/42 | ... | with image screen generating a composite electron beam which is deflected as a whole past a stationary probe to simulate a scanning effect, e.g. Farnsworth pick-up tube |
| H01J 31/44 | ..... | Tubes with image amplification section |
| H01J 31/46 | ... | Tubes in which electrical output represents both intensity and colour of image {colour television cameras with only one tube H04N 9/06 } |
| H01J 31/48 | ... | Tubes with amplification of output effected by electron multiplier arrangements within the vacuum space |
| H01J 31/49 | .. | Pick-up adapted for an input of electromagnetic radiation other than visible light and having an electric output, e.g. for an input of X-rays, for an input of infra-red radiation |
| H01J 31/495 | .. | Pick-up tubes adapted for an input of sonic, ultrasonic, or mechanical vibrations and having an electric output |
| H01J 31/50 | .. | Image-conversion or image-amplification tubes, i.e. having optical, X-ray, or analogous input, and optical output |
| H01J 31/501 | ... | {with an electrostatic electron optic system (H01J 31/52 to H01J 31/56 take precedence)} |
| H01J 31/502 | ..... | {with means to interrupt the beam e.g. shutter for high speed photography (circuits using electron-beam shutters G03B 27/725)} |
| H01J 31/503 | ... | {with an electromagnetic electron-optic system (H01J 31/52 to H01J 31/56 take precedence)} |
| H01J 31/505 | ... | {flat tubes, e.g. proximity focusing tubes} |
| H01J 31/506 | ... | {tubes using secondary emission effect} |
| H01J 31/507 | ..... | {using a large number of channels, e.g. microchannel plates} |
| H01J 31/508 | ... | {Multistage converters} |
| H01J 31/52 | .... | having grid-like image screen through which the electron ray or beam passes and by which the ray or beam is influenced before striking the luminescent output screen, i.e. having "triode action" |
| H01J 31/54 | ... | in which the electron ray or beam is reflected by the image input screen on to the image output screen |
| H01J 31/56 | ... | for converting or amplifying images in two or more colours |
| H01J 31/58 | .. | Tubes for storage of image or information pattern or for conversion of definition of television or like image, i.e. having electrical input and electrical output {(electrostatic memories using electron beam tubes G11C 11/329)} |
| H01J 31/585 | ... | {Monoscopes (H01J 31/60 takes precedence)} |
| H01J 31/60 | ... | having means for deflecting, either selectively or sequentially, an electron ray on to separate surface elements of the screen (by circuitry alone H01J 29/08) |
| H01J 31/62 | ..... | with separate reading and writing rays |
| H01J 31/64 | ..... | on opposite sides of screen, e.g. for conversion of definition |
| H01J 31/66 | ... | having means for allowing all but selected cross-section elements of a homogeneous electron beam to reach corresponding elements of the screen, e.g. selectron |

- H01J 31/68 . . . in which the information pattern represents two or more colours

- H01J 33/00** **Discharge tubes with provision for emergence of electrons or ions from the vessel** ([irradiation devices G21K](#); [particle accelerators H05H](#)); **Lenard tubes**

- H01J 33/02 . Details [{\(vessels for operation at high tension H01J 5/06\)}](#)
- H01J 33/04 .. Windows

- H01J 35/00** **X-ray tubes** ([X-ray lasers H01S 4/00](#); [X-ray technique in general H05G](#), [{e.g. apparatus or processes specially adapted for producing X-rays, not involving X-ray tubes, e.g. involving generation of a plasma H05G 2/00}](#))

- H01J 35/02 . Details
- H01J 35/025 .. [{X-ray tubes with structurally associated circuit elements}](#)
- H01J 35/04 .. Electrodes [{mutual position thereof and constructional adaptations of the electrodes therefor}](#)
- H01J 35/045 ... [{ Electrodes for controlling the current of the cathode ray, e.g. control grids}](#)
- H01J 35/06 ... Cathodes [{\(electron guns in general H01J 3/02\)}](#)
- H01J 35/065 [{Field emission, photo emission or secondary emission cathodes}](#)
- H01J 35/08 ... Anodes; Anti cathodes [{\(anti-cathodes serving as windows H01J 35/18\)}](#)
- H01J 35/10 Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes
- H01J 35/101 [{Arrangements for rotating anodes, e.g. supporting means; greasing; sealing the axle; shielding or protecting the driving means}](#)
- H01J 35/103 [{Rotating anodes with a magnetic bearing}](#)
- H01J 35/105 [{Cooling of rotating anode, e.g. heat emitting layers or structures}](#)
- H01J 35/106 [{Active cooling, e.g. fluid flow, heat pipes}](#)
- H01J 35/108 [{Substrates for and bonding of emissive target, e.g. composite structures}](#)
- H01J 35/12 Cooling non-rotary anodes [{\(mounting the tube within a closed housing, e.g. for cooling purposes H05G 1/04\)}](#)
- H01J 35/14 .. Arrangements for concentrating, focusing, or directing the cathode ray [{\(for cathode ray tubes in general H01J 29/46\)}](#)
- H01J 35/16 .. Vessels; Containers; Shields associated therewith [{\(vessels for high tension operation in general H01J 5/06; mounting the tube within a closed housing H05G 1/04\)}](#)
- H01J 35/165 ... [{joining connectors to the tube}](#)
- H01J 35/18 ... Windows
- H01J 35/20 .. Selection of substances for gas fillings; Means for obtaining or maintaining the desired pressure within the tube, e.g. by gettering [{\(for gas-discharge tubes in general H01J 7/02 to H01J 61/76; evacuating, filling, gettering in general H01J 9/38\)}](#)

- H01J 35/22 . specially designed for passing a very high current for a very short time, e.g. for flash operation

- H01J 35/24 . Tubes wherein the point of impact of the cathode ray on the anode or anti-cathode is movable relative to the surface thereof
- H01J 35/26 .. by rotation of the anode or anti-cathode

- H01J 35/28 . . . by vibration, oscillation, reciprocation, or swash-plate motion of the anode or anti-cathode
- H01J 35/30 . . . by deflection of the cathode ray
- H01J 35/305 . . . {by using a rotating X-ray tube in conjunction therewith}
- H01J 35/32 . Tubes wherein the X-rays are produced at or near the end of the tube or a part thereof which tube or part has a small cross-section to facilitate introduction into a small hole or cavity

- H01J 37/00** **Discharge tubes with provision for introducing objects or material to be exposed to the discharge, e.g. for the purpose of examination or processing thereof**
([H01J 33/00](#), [H01J 40/00](#), [H01J 41/00](#), [H01J 47/00](#), [H01J 49/00](#) take precedence; { scanning-probe techniques or apparatus [G01Q](#)}; contactless testing of electronic circuits using electron beams [G01R 31/305](#); { particle accelerators [H05H](#)})

- H01J 37/02 . Details
- H01J 37/023 . . . {Means for mechanically adjusting components not otherwise provided for (mechanically adjusting from the outside of electron or ion-optical components [H01J 37/067](#); positioning the object or material [H01J 37/20](#); vacuum locks, means for obtaining or maintaining the desired pressure within the tube [H01J 37/18](#); other manipulating devices [H01L 21/48](#), [G21F](#))}
- H01J 37/026 . . . {Means for avoiding or neutralising unwanted electrical charges on tube components}
- H01J 37/04 . . . Arrangements of electrodes and associated parts for generating or controlling the discharge, e.g. electron-optical arrangement, ion-optical arrangement {electron or ion-optical systems for localised treatment of materials [H01J 37/3007](#); discharge control means in gas filled discharge tubes [H01J 37/32D1](#)}
- H01J 37/045 . . . {Beam blanking or chopping, i.e. arrangements for momentarily interrupting exposure to the discharge}
- H01J 37/05 . . . Electron or ion-optical arrangements for separating electrons or ions according to their energy { or mass}(particle separator tubes [H01J 49/00](#))
- H01J 37/06 . . . Electron sources; Electron guns {electron sources in general [H01J 1/02](#), [H01J 19/02](#); electron guns in general [H01J 3/02](#)}
- H01J 37/061 {Electron guns using electron multiplication}
- H01J 37/063 Geometrical arrangement of electrodes for beam-forming
- H01J 37/065 Construction of guns or parts thereof ([H01J 37/067](#) to [H01J 37/077](#) take precedence)
- H01J 37/067 Replacing parts of guns; Mutual adjustment of electrodes ([H01J 37/073](#) to [H01J 37/077](#) take precedence; vacuum locks [H01J 37/18](#))
- H01J 37/07 Eliminating deleterious effects due to thermal effects or electric or magnetic fields ([H01J 37/073](#) to [H01J 37/077](#) take precedence)
- H01J 37/073 Electron guns using field emission, photo emission, or secondary emission electron sources
- H01J 37/075 Electron guns using thermionic emission from cathodes heated by particle bombardment or by irradiation, e.g. by laser
- H01J 37/077 Electron guns using discharge in gases or vapours as electron sources
- H01J 37/08 . . . Ion sources; Ion guns
- H01J 37/09 . . . Diaphragms; Shields associated with electron or ion-optical arrangements; Compensation of disturbing fields
- H01J 37/10 . . . Lenses

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|--------------|-------|---|
| H01J 37/12 | | electrostatic |
| H01J 37/14 | | magnetic |
| H01J 37/141 | | Electromagnetic lenses |
| H01J 37/1413 | ..... | {Means for interchanging parts of the lens, e.g. pole pieces, within the tube (mechanically adjusting electron (ion) optical components H01J 37/15)} |
| H01J 37/1416 | ..... | { with supra-conducting coils} |
| H01J 37/143 | ..... | Permanent magnetic lenses |
| H01J 37/145 | .... | Combinations of electrostatic and magnetic lenses |
| H01J 37/147 | ... | Arrangements for directing or deflecting the discharge along a desired path (H01J 37/045 takes precedence); lenses H01J 37/10) |
| H01J 37/1471 | .... | {for centering, aligning or positioning of ray or beam} |
| H01J 37/1472 | .... | {Deflecting along given lines} |
| H01J 37/1474 | ..... | {Scanning means} |
| H01J 37/1475 | ..... | {magnetic} |
| H01J 37/1477 | ..... | {electrostatic} |
| H01J 37/1478 | .... | {Beam tilting means, i.e. for stereoscopy or for beam channelling} |
| H01J 37/15 | .... | External mechanical adjustment of electron or ion optical components (H01J 37/067 , H01J 37/20 take precedence) |
| H01J 37/153 | ... | Electron-optical or ion-optical arrangements for the correction of image defects, e.g. stigmators |
| H01J 37/16 | .. | Vessels; Containers |
| H01J 37/165 | ... | {Means associated with the vessel for preventing the generation of or for shielding unwanted radiation, e.g. X-rays} |
| H01J 37/18 | .. | Vacuum locks; { Means for obtaining or maintaining the desired pressure within the vessel (vacuum locks for electron-beam tubes in general H01J 29/865)} |
| H01J 37/185 | ... | {Means for transferring objects between different enclosures of different pressure or atmosphere} |
| H01J 37/20 | .. | Means for supporting or positioning the objects or the material; Means for adjusting diaphragms or lenses associated with the support {(introducing the objects H01J 37/18 ; preparing specimens for investigation G01N 1/06 , G01N 1/28)} |
| H01J 37/21 | .. | Means for adjusting the focus {(adjusting the focus while observing the image by photographic or optical means H01J 37/22 ; means for observing the object or the point of impact on the object in tubes for the localised treatment of materials H01J 37/3005)} |
| H01J 37/22 | .. | Optical or photographic arrangements associated with the tube {(using a CRT for the display of the image in a scanning electron microscope H01J 37/28 ; observing the object or the point of impact on the object in tubes for the localised treatment of materials H01J 37/3007)} |
| H01J 37/222 | ... | {Image processing arrangements associated with the tube (image data processing or generation, in general G06T)} |
| H01J 37/224 | ... | { Luminescent screens or photographic plates for imaging (photosensitive materials for photographic purposes G03C); Apparatus specially adapted therefor, e.g. cameras, TV-cameras, photographic equipment, exposure control; Optical subsystems specially adapted therefor, e.g. microscopes for observing image on luminescent screen} |
| H01J 37/226 | ... | { Optical arrangements for illuminating the object; optical arrangements for collecting light from the object} |

- H01J 37/228 { whereby illumination and light collection take place in the same area of the discharge}
- H01J 37/24 .. Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- H01J 37/241 ... {High voltage power supply or regulation circuits ([components H01J 37/248](#))}
- H01J 37/242 ... { Filament heating power supply or regulation circuits ([H01J 37/241 takes precedence](#))}
- H01J 37/243 ... {Beam current control or regulation circuits ([H01J 37/241 takes precedence](#))}
- H01J 37/244 .. Detectors; Associated components or circuits therefor ([detectors per se G01T](#))
- H01J 37/248 .. Components associated with high voltage supply ({[Means for measuring the high voltage per se G01R 15/00](#)}; [high voltage supply per se H02J, H02M](#))}

- H01J 37/252 . Tubes for spot-analysing by electron or ion beams; Microanalysers ([investigating or analysing thereby G01N 23/22](#))
- H01J 37/256 .. using scanning beams

- H01J 37/26 . Electron or ion microscopes; Electron or ion diffraction tubes
- H01J 37/261 .. {Details}
- H01J 37/263 ... {Contrast, resolution or power of penetration}
- H01J 37/265 ... {Controlling the tube; circuit arrangements adapted to a particular application not otherwise provided, e.g. bright-field-dark-field illumination}
- H01J 37/266 .. {Measurement of magnetic- or electric fields in the object; Lorentzmicroscopy ([emission microscopes H01J 37/285](#); [reflecting microscopes H01J 37/29](#); [spot analysing H01J 37/252](#))}
- H01J 37/268 ... {with scanning beams}
- H01J 37/27 .. Shadow microscopy
- H01J 37/28 .. with scanning beams ({[H01J 37/268, H01J 37/292, H01J 37/2955 take precedence](#)}; [microanalysers using scanning beams H01J 37/256](#))}
- H01J 37/285 .. Emission microscopes, e.g. field-emission microscopes
- H01J 37/29 .. Reflection microscopes
- H01J 37/292 ... {using scanning ray}
- H01J 37/295 .. Electron or ion diffraction tubes
- H01J 37/2955 ... {using scanning ray}

- H01J 37/30 . Electron-beam or ion-beam tubes for localised treatment of objects
- H01J 37/3002 .. {Details}
- H01J 37/3005 ... {Observing the objects or the point of impact on the object}
- H01J 37/3007 ... {Electron or ion-optical systems ([electron or ion-optical details H01J 37/06 to H01J 37/153](#))}
- H01J 37/301 .. Arrangements enabling beams to pass between regions of different pressure
- H01J 37/302 .. Controlling tubes by external information, e.g. programme control ([H01J 37/304 takes precedence](#))
- H01J 37/3023 ... {Programme control}
- H01J 37/3026 ... {Patterning strategy}
- H01J 37/304 .. Controlling tubes by information coming from the objects {[or from the beam](#)}, e.g. correction signals
- H01J 37/3045 ... {Object or beam position registration}

- H01J 37/305 .. for casting, melting, evaporating or etching {(methods for casting or melting of metals with electron beam or gas discharges [C22B 9/22](#))}
- H01J 37/3053 ... {for evaporating or etching (methods for evaporating or etching metals with electron or ion beams [C23C 14/30](#))}
- H01J 37/3056 {for microworking, e.g. etching of gratings, trimming of electrical components (trimming of resistors [H01C 17/22](#))}
- H01J 37/31 .. for cutting or drilling {(methods for cutting or drilling metals with electron beams [B23K 15/00](#))}
- H01J 37/315 .. for welding {(methods for welding metals with electron beams [B23K 15/00](#))}
- H01J 37/317 .. for changing properties of the objects or for applying thin layers thereon, e.g. for ion implantation ([H01J 37/36](#) takes precedence)
- H01J 37/3171 ... {for ion implantation (plasma immersion ion implantation **H01J 37/32J**)}
- H01J 37/3172 {Maskless patterned ion implantation}
- H01J 37/3174 ... { Particle-beam lithography, e.g. electron beam lithography}
- H01J 37/3175 {Projection methods, i.e. transfer substantially complete pattern to substrate}
- H01J 37/3177 {Multi-beam, e.g. fly`s eye, comb probe}
- H01J 37/3178 ... {for applying thin layers on objects}

- H01J 37/32 . Gas-filled discharge tubes, { e.g. for surface treatment of objects such as coating, plating, etching, sterilising or bringing about chemical reactions}{ general methods or devices for heat treatments of ferrous or non-ferrous metals or alloys by cathodic discharges [C21D 1/38](#); methods of carburising or nitriding of metals in general [C23C 8/00](#); methods for coating, plating or surface treating of or with metallic material [C23C 8/36](#), [C23C 14/32](#), [C23C 16/50](#); methods for coating, plating or surface treating of or with semiconductors [H01L 21/00](#); heating by discharge [H05B](#)}

WARNING

H01J 37/32D and **H01JH01J 37/32D1** are no longer used for the classification of new documents as from 1 November 2011. The backlog of these groups is being continuously reclassified to the subgroups [H01JH01J 37/32009](#)-[H01JH01J 37/32917](#). Pending reorganisation, the subgroups [H01JH01J 37/32009](#)-[H01JH01J 37/3299](#) are not complete, see provisionally also **H01JH01J 37/32D** and **H01JH01J 37/32D1**

- H01J 37/32009 .. { Arrangements for generation of plasma specially adapted for examination or treatment of objects, e.g. plasma sources (plasma generation in general [H05H 1/24](#))}
- H01J 37/32018 ... { Glow discharge}
- H01J 37/32027 { DC powered}
- H01J 37/32036 { AC powered}
- H01J 37/32045 { Circuits specially adapted for controlling the glow discharge}
- H01J 37/32055 ... { Arc discharge}
- H01J 37/32064 { Circuits specially adapted for controlling the arc discharge (for plasma torches [H01H 1/36](#))}
- H01J 37/32073 ... { Corona discharge}
- H01J 37/32082 ... { Radio frequency generated discharge ([H01JH01J 37/32357](#), [H01JH01J 37/32366](#), [H01JH01J 37/32394](#) and [H01JH01J 37/32403](#) take precedence)}
- H01J 37/32091 { the radio frequency energy being capacitively coupled to the plasma}

| | | |
|---------------|-------|--|
| H01J 37/321 | .... | { the radio frequency energy being inductively coupled to the plasma} |
| H01J 37/3211 | ..... | { Antennas, e.g. particular shapes of coils} |
| H01J 37/32119 | ..... | { Windows} |
| H01J 37/32128 | .... | { using particular waveforms, e.g. polarised waves} |
| H01J 37/32137 | .... | { controlling of the discharge by modulation of energy} |
| H01J 37/32146 | ..... | { Amplitude modulation, includes pulsing} |
| H01J 37/32155 | ..... | { Frequency modulation} |
| H01J 37/32165 | ..... | { Plural frequencies} |
| H01J 37/32174 | .... | { Circuits specially adapted for controlling the RF discharge} |
| H01J 37/32183 | ..... | { Matching circuits, impedance matching circuits per se H03H 7/38 and H03H 7/40 } |
| H01J 37/32192 | ... | { Microwave generated discharge (H01JH01J 37/32357 , H01JH01J 37/32366 , H01JH01J 37/32394 , H01JH01J 37/32403 take precedence)} |
| H01J 37/32201 | .... | { Generating means} |
| H01J 37/32211 | .... | { Means for coupling power to the plasma} |
| H01J 37/3222 | ..... | { Antennas} |
| H01J 37/32229 | ..... | { Waveguides} |
| H01J 37/32238 | ..... | { Windows} |
| H01J 37/32247 | ..... | { Resonators} |
| H01J 37/32256 | ..... | { Tuning means} |
| H01J 37/32266 | .... | { Means for controlling power transmitted to the plasma} |
| H01J 37/32275 | ..... | { Microwave reflectors} |
| H01J 37/32284 | ..... | { Means for controlling or selecting resonance mode} |
| H01J 37/32293 | .... | { using particular waveforms, e.g. polarised waves} |
| H01J 37/32302 | .... | { Plural frequencies} |
| H01J 37/32311 | .... | { Circuits specially adapted for controlling the microwave discharge} |
| H01J 37/32321 | ... | { Discharge generated by other radiation (H01JH01J 37/32055 , H01JH01J 37/32055 , H01JH01J 37/32073 , H01JH01J 37/32082 , H01JH01J 37/32192 , H01JH01J 37/32348 take precedence)} |
| H01J 37/3233 | .... | { using charged particles} |
| H01J 37/32339 | .... | { using electromagnetic radiation} |
| H01J 37/32348 | ... | { Dielectric barrier discharge} |
| H01J 37/32357 | ... | { Generation remote from the workpiece; e.g. down-stream} |
| H01J 37/32366 | ... | { Localised processing} |
| H01J 37/32376 | ..... | { Scanning across large workpieces} |
| H01J 37/32385 | ..... | [N: Treating the edge of the workpieces] |
| H01J 37/32394 | ... | { Treating interior parts of workpieces} |
| H01J 37/32403 | ... | { Treating multiple sides of workpieces; e.g. 3D workpieces} |
| H01J 37/32412 | ... | { Plasma immersion ion implantation} |
| H01J 37/32422 | ... | { Arrangement for selecting ions or species in the plasma} |
| H01J 37/32431 | .. | { Constructional details of the reactor} |
| H01J 37/3244 | ... | { Gas supply means} |
| H01J 37/32449 | | { Gas control, e.g. control of the gas flow} |

| | | |
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| H01J 37/32458 | ... | { Vessel} |
| H01J 37/32467 | | { Material} |
| H01J 37/32477 | | { characterised by the means for protecting vessels or internal parts, e.g. coatings} |
| H01J 37/32486 | ..... | { Means for reducing recombination coefficient} |
| H01J 37/32495 | ..... | { Means for protecting the vessel against plasma} |
| H01J 37/32504 | ..... | { Means for preventing sputtering of the vessel} |
| H01J 37/32513 | ..... | { Sealing means, e.g. sealing between different parts of the vessel} |
| H01J 37/32522 | ..... | { Temperature} |
| H01J 37/32532 | ... | { Electrodes} |
| H01J 37/32541 | ..... | { Shape} |
| H01J 37/3255 | ..... | { Material} |
| H01J 37/32559 | ..... | { Protection means, e.g. coatings} |
| H01J 37/32568 | ..... | { Relative arrangement or disposition of electrodes; moving means} |
| H01J 37/32577 | ..... | { Electrical connecting means} |
| H01J 37/32587 | ..... | { Triode systems} |
| H01J 37/32596 | ..... | { Hollow cathodes} |
| H01J 37/32605 | ..... | { Removable or replaceable electrodes or electrode systems} |
| H01J 37/32614 | ..... | { Consumable cathodes for arc discharge} |
| H01J 37/32623 | ... | { Mechanical discharge control means} |
| H01J 37/32633 | ..... | { Baffles} |
| H01J 37/32642 | ..... | { Focus rings} |
| H01J 37/32651 | ..... | { Shields, e.g. dark space shields, Faraday shields} |
| H01J 37/3266 | ... | { Magnetic control means} |
| H01J 37/32669 | ..... | { Particular magnets or magnet arrangements for controlling the discharge} |
| H01J 37/32678 | ..... | { Electron cyclotron resonance} |
| H01J 37/32688 | ..... | { Multi-cusp fields} |
| H01J 37/32697 | ... | { Electrostatic control} |
| H01J 37/32706 | ..... | { Polarising the substrate} |
| H01J 37/32715 | ... | { Workpiece holder} |
| H01J 37/32724 | ..... | { Temperature} |
| H01J 37/32733 | ... | { Means for moving the material to be treated} |
| H01J 37/32743 | ..... | { for introducing the material into processing chamber} |
| H01J 37/32752 | ..... | { for moving the material across the discharge} |
| H01J 37/32761 | ..... | { Continuous moving} |
| H01J 37/3277 | ..... | { of continuous material} |
| H01J 37/32779 | ..... | { of batches of workpieces} |
| H01J 37/32788 | ..... | { for extracting the material from the process chamber} |
| H01J 37/32798 | ... | { Further details of plasma apparatus not provided for in groups H01J 37/3244-H01J 37/32788 ; special provisions for cleaning or maintenance of the apparatus} |
| H01J 37/32807 | ..... | { Construction (includes replacing parts of the apparatus)} |
| H01J 37/32816 | ..... | { Pressure} |

| | | |
|---------------|-------|---|
| H01J 37/32825 | ..... | { Working under atmospheric pressure or higher} |
| H01J 37/32834 | ..... | { Exhausting} |
| H01J 37/32844 | ..... | { Treating effluent gases} |
| H01J 37/32853 | ..... | { Hygiene} |
| H01J 37/32862 | ..... | { In situ cleaning of vessels and/or internal parts} |
| H01J 37/32871 | ..... | { Means for trapping or directing unwanted particles} |
| H01J 37/3288 | ..... | { Maintenance} |
| H01J 37/32889 | ..... | [N: Connection or combination with other apparatus |
| H01J 37/32899 | ..... | { Multiple chambers, e.g. cluster tools} |
| H01J 37/32908 | ..... | { Utilities} |
| H01J 37/32917 | .. | { Plasma diagnostics} |
| H01J 37/32926 | ... | { Software, data control or modelling} |
| H01J 37/32935 | ... | { Monitoring and controlling tubes by information coming from the object and/or discharge} |
| H01J 37/32944 | ..... | { Arc detection} |
| H01J 37/32954 | ..... | { Electron temperature measurement} |
| H01J 37/32963 | ..... | { End-point detection} |
| H01J 37/32972 | ..... | { Spectral analysis} |
| H01J 37/32981 | ..... | { Gas analysis} |
| H01J 37/3299 | ... | { Feedback systems} |
| H01J 37/34 | .. | operating with cathodic sputtering (H01J 37/36 takes precedence; {methods of cathodic sputtering C23C 14/34 }) |
| H01J 37/3402 | ... | {using supplementary magnetic fields} |
| H01J 37/3405 | ..... | {Magnetron sputtering} |
| H01J 37/3408 | ..... | {Planar magnetron sputtering} |
| H01J 37/3411 | ... | { Constructional aspects of the reactor} |
| H01J 37/3414 | ..... | { Targets} |
| H01J 37/3417 | ..... | { Arrangements} |
| H01J 37/342 | ..... | { Hollow targets} |
| H01J 37/3423 | ..... | { Shape} |
| H01J 37/3426 | ..... | { Material} |
| H01J 37/3429 | ..... | { Plural materials} |
| H01J 37/3432 | ..... | { Target-material dispenser} |
| H01J 37/3435 | ..... | { Target holders (includes backing plates and endblocks)} |
| H01J 37/3438 | ..... | { Electrodes other than cathode} |
| H01J 37/3441 | ..... | { Dark space shields} |
| H01J 37/3444 | ..... | { Associated circuits} |
| H01J 37/3447 | ..... | { Collimators, shutters, apertures} |
| H01J 37/345 | ..... | { Magnet arrangements in particular for cathodic sputtering apparatus (material of magnets or magnets in general H01F 1/00 , H01F 7/00)} |
| H01J 37/3452 | ..... | { Magnet distribution} |
| H01J 37/3455 | ..... | { Movable magnets} |

- H01J 37/3458 { Electromagnets in particular for cathodic sputtering apparatus
(electromagnets in general [H01F 7/06](#))}
- H01J 37/3461 { Means for shaping the magnetic field, e.g. magnetic shunts}
- H01J 37/3464 ... { Operating strategies}
- H01J 37/3467 { Pulsed operation, e.g. HIPIMS}
- H01J 37/347 { Thickness uniformity of coated layers or desired profile of target erosion}
- H01J 37/3473 { Composition uniformity or desired gradient}
- H01J 37/3476 ... { Testing and control}
- H01J 37/3479 { Detecting exhaustion of target material}
- H01J 37/3482 { Detecting or avoiding eroding through}
- H01J 37/3485 { Means for avoiding target poisoning}
- H01J 37/3488 ... { Constructional details of particle beam apparatus not otherwise provided for,
e.g. arrangement, mounting, housing, environment; special provisions for
cleaning or maintenance of the apparatus}
- H01J 37/3491 { Manufacturing of targets}
- H01J 37/3494 { Adaptation to extreme pressure conditions}
- H01J 37/3497 { Temperature of target}
- H01J 37/36 .. for cleaning surfaces while plating with ions of materials introduced into the
discharge, e.g. introduced by evaporation {(condensing of electrically charged
vapour onto a surface for covering materials with metals [C23C 14/32](#))}

H01J 40/00 **Photoelectric discharge tubes not involving the ionisation of a gas** ([H01J 49/00](#)
takes precedence; cathode-ray or image-pick-up tubes [H01J 31/26](#))

- H01J 40/02 . Details
- H01J 40/04 .. Electrodes
- H01J 40/06 ... Photo-emissive cathodes
- H01J 40/08 .. Magnetic means for controlling discharge
- H01J 40/10 .. Selection of substances for gas fillings
- H01J 40/12 .. One or more circuit elements structurally associated with the tube
- H01J 40/14 .. Circuit arrangements not adapted to a particular application of the tube and not
otherwise provided for
- H01J 40/16 . having photo- emissive cathode, e.g. alkaline photoelectric cell ([operating with
secondary emission H01J 43/00](#))
- H01J 40/18 .. with luminescent coatings for influencing the sensitivity of the tube, e.g. by
converting the input wavelength ([image-conversion or image-amplification tubes
H01J 31/50](#))
- H01J 40/20 .. wherein a light-ray scans a photo-emissive screen

H01J 41/00 **Discharge tubes for measuring pressure of introduced gas** {or for detecting presence
of gas}; **Discharge tubes for evacuation by diffusion of ions**

- H01J 41/02 . Discharge tubes for measuring pressure of introduced gas {or for detecting presence
of gas}
- H01J 41/04 .. with ionisation by means of thermionic cathodes

- H01J 41/06 . . with ionisation by means of cold cathodes
- H01J 41/08 . . with ionisation by means of radioactive substances, e.g. alphasources
- H01J 41/10 . . of particle spectrometer type ([particle spectrometers per se H01J 49/00](#)){ not used, see [G01L 21/30](#)}

- H01J 41/12 . Discharge tubes for evacuating by diffusion of ions, e.g. ion pumps, getter ion pumps
- H01J 41/14 . . with ionisation by means of thermionic cathodes
- H01J 41/16 . . . using gettering substances
- H01J 41/18 . . with ionisation by means of cold cathodes
- H01J 41/20 . . . using gettering substances

- H01J 43/00** **Secondary-emission tubes; Electron-multiplier tubes** (dynamic electron-multiplier tubes [H01J 25/76](#); secondary-emission detectors for measurement of nuclear or X-radiation [G01T 1/28](#))

- H01J 43/02 . Tubes in which one or a few electrodes are secondary-electron emitting electrodes
- H01J 43/025 . . {Circuits therefor}

- H01J 43/04 . Electron multipliers {(if forming part of electron gun [H01J 3/023](#))}
- H01J 43/045 . . {Position sensitive electron multipliers}
- H01J 43/06 . . Electrode arrangements
- H01J 43/08 . . . Cathode arrangements ({photo-emissive electrodes [H01J 1/34](#), [H01J 1/35](#)}; construction of photo cathodes [H01J 40/06](#), [H01J 40/16](#), [H01J 47/00](#), [H01J 49/08](#))
- H01J 43/10 . . . Dynodes ([H01J 43/24](#), [H01J 43/26](#) take precedence; secondary-electron-emitting electrodes in general [H01J 1/32](#))
- H01J 43/12 . . . Anode arrangements
- H01J 43/14 . . . Control of electron beam by magnetic field
- H01J 43/16 . . . Electrode arrangements using essentially one dynode
- H01J 43/18 . . . Electrode arrangements using essentially more than one dynode
- H01J 43/20 Dynodes consisting of sheet material, e.g. plane, bent
- H01J 43/22 Dynodes consisting of electron-permeable material, e.g. foil, grid, tube, venetian blind
- H01J 43/24 Dynodes having potential gradient along their surfaces
- H01J 43/243 {Dynodes consisting of a piling-up of channel-type dynode plates}
- H01J 43/246 { Micro-channel plates [MCP](image amplification tubes using MCP [H01J 31/507](#))}
- H01J 43/26 Box dynodes
- H01J 43/28 . . Vessels {wall of the tube}; Windows; Screens; Suppressing undesired discharges or currents
- H01J 43/30 . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

- H01J 45/00** **Discharge tubes functioning as thermionic generators** {(structural combination of fuel element with thermoelectric element [G21C 3/40](#); nuclear power plants using thermionic converters [G21D 7/04](#); structural combination of a radioactive source with a thermionic

converter, e.g. radioisotope batteries [G21H 1/10](#); generators in which thermal or kinetic energy is converted into electrical energy by ionisation of a fluid and removal of the charge therefrom [H02N 3/00](#)}}

- H01J 47/00** **Tubes for determining the presence, intensity, density or energy of radiation or particles** ({discharge tubes using igniting by associated radioactive materials or fillings, e.g. current stabilising tubes [H01J 17/32](#); photoelectric discharge tubes not involving the ionisation of a gas [H01J 40/00](#); {discharge tubes for measuring the pressure, partial pressure of introduced gas or for detecting presence of gas [H01J 41/02](#); ionisation chambers using a solid dielectric [G01T 3/008](#)})
- H01J 47/001 . {Details}
 - H01J 47/002 .. {Vessels or containers}
 - H01J 47/003 ... {using tissue-equivalent materials}
 - H01J 47/004 ... {Windows permeable to X-rays, gamma-rays, or particles (windows for discharge tubes with provision for emergence of electrons or ions from the vessel [H01J 33/04](#); windows for X-ray tubes [H01J 35/18](#))}
 - H01J 47/005 .. {Gas fillings ([H01J 47/12](#) takes precedence); Maintaining the desired pressure within the tube}
 - H01J 47/006 ... {Tissue equivalent gas fillings}
 - H01J 47/007 . {Flash detectors}
 - H01J 47/008 . {Drift detectors}
 - H01J 47/02 . Ionisation chambers
 - H01J 47/022 .. {Calibration thereof}
 - H01J 47/024 .. {Well-type ionisation chambers}
 - H01J 47/026 .. {Gas flow ionisation chambers}
 - H01J 47/028 .. {using a liquid dielectric}
 - H01J 47/04 .. Capacitive ionisation chambers, e.g. the electrodes of which are used as electrometers
 - H01J 47/06 . Proportional counter tubes
 - H01J 47/062 .. {Multiwire proportional counter tubes}
 - H01J 47/065 .. {Well-type proportional counter tubes}
 - H01J 47/067 .. {Gas flow proportional counter tubes}
 - H01J 47/08 . Geiger-Müller counter tubes ({gas filling with very short deionisation times [H01J 17/64](#), [H01T](#)})
 - H01J 47/10 . Spark counters ([H01J 47/14](#) takes precedence; spark gaps [H01T](#))
 - H01J 47/12 . Neutron detector tubes, e.g. BF₃ tubes
 - H01J 47/1205 .. { using nuclear reactions of the type (n, alpha) in solid materials, e.g. Boron-10 (n,alpha) Lithium-7, Lithium-6 (n, alpha) Hydrogen-3}
 - H01J 47/1211 ... {Ionisation chambers}

- H01J 47/1216 {Gamma compensated}
- H01J 47/1222 . . . {Proportional counters}
- H01J 47/1227 . . {Fission detectors}
- H01J 47/1233 . . . {Ionisation chambers}
- H01J 47/1238 . . . {Counters}
- H01J 47/1244 {Multiwire counters}
- H01J 47/125 . . {Helium ionisation detectors}
- H01J 47/1255 . . . {Ionisation chambers}
- H01J 47/1261 . . . {Counters}
- H01J 47/1266 {Multi-wire counters}
- H01J 47/1272 . . {BF3 tubes}
- H01J 47/1277 . . {Light-nuclei-recoil ionisation detectors, e.g. using protons, alpha-particles}
- H01J 47/1283 . . . {Ionisation chambers}
- H01J 47/1288 . . . {Counters}
- H01J 47/1294 {Multi-wire counters}

- H01J 47/14 . . Parallel electrode spark or streamer chambers; Wire spark or streamer chambers
{circuit arrangements with multi-wire or parallel-plate chambers for recording of
movements or tracks of particles [G01T 5/12](#)}
- H01J 47/16 . . characterised by readout of each individual wire
- H01J 47/18 . . . the readout being electrical ([H01J 47/20](#) takes precedence)
- H01J 47/20 . . . the readout employing electrical or mechanical delay lines, e.g. magnetostrictive
delay lines
- H01J 47/22 . . characterised by another type of readout
- H01J 47/24 . . . the readout being acoustical
- H01J 47/26 . . . the readout being optical

H01J 49/00 Particle spectrometer or separator tubes

NOTE

In classifying particle separators, no distinction is made between spectrometry and spectrography, the difference being only in the manner of detection which in the first case is electrical and in the second case is by means of a photographic film.

- H01J 49/0004 . { Imaging particle spectrometry}
- H01J 49/0009 . { Calibration of the apparatus}
- H01J 49/0013 . { Miniaturised spectrometers, e. g. having smaller than usual scale, integrated
conventional components}
- H01J 49/0018 . . { Microminiaturised spectrometers, e. g. chip-integrated devices,
Micro-Electro-Mechanical Systems (MEMS)}
- H01J 49/0022 . { Portable spectrometers, e. g. devices comprising independent power supply,
constructional details relating to portability (small scale devices per se [H01J 49/0013](#)
and [H01J 49/0018](#))}

- H01J 49/0027 . { Methods for using particle spectrometers}
- H01J 49/0031 .. { Step by step routines describing the use of the apparatus ([H01J 49/0081](#) takes precedence)}
- H01J 49/0036 .. { Step by step routines describing the handling of the data generated during a measurement (recognising patterns in signals [G06K 9/00496](#); bioinformatics [G06F 19/10](#))}

- H01J 49/004 . { Combinations of spectrometers, tandem spectrometers, e. g. MS/MS, MSn}
- H01J 49/0045 .. { characterised by the fragmentation or other specific reaction}
- H01J 49/005 ... { by collision with gas, e.g. by introducing gas or by accelerating ions with an electric field}
- H01J 49/0054 ... { by an electron beam, e.g. electron impact dissociation, electron capture dissociation}
- H01J 49/0059 ... { by a photon beam, photo-dissociation}
- H01J 49/0063 ... { by applying a resonant excitation voltage}
- H01J 49/0068 ... { by collision with a surface, e.g. surface induced dissociation}
- H01J 49/0072 ... { by ion/ion reaction, e.g. electron transfer dissociation, proton transfer dissociation}
- H01J 49/0077 ... { specific reactions other than fragmentation}
- H01J 49/0081 .. { Tandem in time, i.e. using a single spectrometer}
- H01J 49/0086 .. { Accelerator mass spectrometers}
- H01J 49/009 .. { Spectrometers having multiple channels, parallel analysis}

- H01J 49/0095 . { Particular arrangements for generating, introducing or analyzing both positive and negative analyte ions (ion/ion reactions [H01J 49/0072](#))}

- H01J 49/02 . Details
- H01J 49/022 .. { Circuit arrangements, e.g. for generating deviation currents or voltages (regulating electric or magnetic variables in general e.g. current, magnetic field [G05F](#)); Components associated with high voltage supply (high voltage supply per se [H02M](#))}
- H01J 49/025 .. { Detectors specially adapted to particle spectrometers (data acquisition [H01J 49/0036](#); detectors per se [G01T](#), e.g. [G01T 1/28](#), [G01T 1/29](#))}
- H01J 49/027 ... { detecting image current induced by the movement of charged particles ([H01J 49/38](#) takes precedence)}
- H01J 49/04 .. Arrangements for introducing or extracting samples to be analysed, e.g. vacuum locks; Arrangements for external adjustment of electron- or ion-optical components
- H01J 49/0404 ... { Capillaries used for transferring samples or ions (electrospray nozzles [H01J 49/167](#))}
- H01J 49/0409 ... { Sample holders or containers (containers for retaining a material to be analyzed, [B01L 3/00C](#), for DNA, [C12Q 1/6834](#), for biological materials, [G01N 33/543](#))}
- H01J 49/0413 { for automated handling}
- H01J 49/0418 { for laser desorption, e.g. matrix-assisted laser desorption/ionisation [MALDI], surface enhanced laser desorption/ionisation [SELDI] plates}
- H01J 49/0422 ... { for gaseous samples (interfaces to gas chromatographs [G01N 30/7206](#))}
- H01J 49/0427 { using a membrane permeable to gases}

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| H01J 49/0431 | ... | { for liquid samples (interfaces to liquid chromatographs G01N 30/7233)} |
| H01J 49/0436 | .... | { using a membrane permeable to liquids} |
| H01J 49/044 | .... | { with means for preventing droplets from entering the analyzer; Desolvation of droplets} |
| H01J 49/0445 | .... | { with means for introducing as a spray, a jet or an aerosol (electrospray ion sources H01J 49/165)} |
| H01J 49/045 | ..... | { with means for using a nebulising gas, i.e. pneumatically assisted} |
| H01J 49/0454 | .... | { with means for vaporising using mechanical energy, e.g. by ultrasonic vibrations} |
| H01J 49/0459 | ... | { for solid samples} |
| H01J 49/0463 | .... | { Desorption by laser or particle beam, followed by ionisation as a separate step (sample holder per se H01J 49/0418)} |
| H01J 49/0468 | ... | { with means for heating or cooling the sample} |
| H01J 49/0472 | .... | { with means for pyrolysis} |
| H01J 49/0477 | .... | { using a hot fluid} |
| H01J 49/0481 | .... | { with means for collisional cooling} |
| H01J 49/0486 | .... | { with means for monitoring the sample temperature} |
| H01J 49/049 | .... | { with means for applying heat to desorb the sample; Evaporation} |
| H01J 49/0495 | ... | { Vacuum locks; Valves (valves per se F16K)} |
| H01J 49/06 | .. | Electron- or ion-optical arrangements |
| H01J 49/061 | ... | { Ion deflecting means, e. g. ion gates} |
| H01J 49/062 | ... | { Ion guides (linear ion traps performing mass selection H01J 49/4225 , mass filters H01J 49/421)} |
| H01J 49/063 | .... | { Multipole ion guides, e.g. quadrupoles, hexapoles} |
| H01J 49/065 | .... | { having stacked electrodes, e.g. ring stack, plate stack} |
| H01J 49/066 | ..... | { Ion funnels} |
| H01J 49/067 | ... | { Ion lenses, apertures, skimmers} |
| H01J 49/068 | ... | { Mounting, supporting, spacing, or insulating electrodes} |
| H01J 49/08 | .. | Electron sources, e.g. for generating photo-electrons, secondary electrons or Auger electrons |
| H01J 49/10 | .. | Ion sources; Ion guns |
| H01J 49/102 | ... | {using reflex discharge, e.g. Penning ion sources} |
| H01J 49/105 | ... | { using high-frequency excitation, e.g. micro wave excitation, Inductively Coupled Plasma [ICP]} |
| H01J 49/107 | ... | { Arrangements for using several ion sources} |
| H01J 49/12 | ... | using an arc discharge, e.g. of the duoplasmatron type |
| H01J 49/123 | .... | {Duoplasmatrons} |
| H01J 49/126 | .... | {Other arc discharge ion sources using an applied magnetic field} |
| H01J 49/14 | ... | using particle bombardment, e.g. ionisation chambers |
| H01J 49/142 | .... | {using a solid target which is not previously vapourised} |
| H01J 49/145 | .... | {using chemical ionisation} |
| H01J 49/147 | .... | { with electrons, e.g. electron impact ionisation, electron attachment (H01J 49/145 takes precedence)} |
| H01J 49/16 | ... | using surface ionisation, e.g. field-, thermionic- or photo-emission |

- H01J 49/161 {using photoionisation, e.g. by laser}
- H01J 49/162 { Direct photo-ionisation, e.g. single photon or multi-photon ionisation}
- H01J 49/164 { Laser desorption/ionisation, e.g. matrix-assisted laser desorption/ionisation [MALDI]}(sample holders [H01J 49/0418](#))
- H01J 49/165 { Electrospray ionisation}
- H01J 49/167 { Capillaries and nozzles specially adapted therefor; (electrostatic spraying per se B05B5)}
- H01J 49/168 { field ionisation, e.g. corona discharge (atmospheric pressure corona discharge per se H01T19)}
- H01J 49/18 . . . using spark ionisation
- H01J 49/20 . . . Magnetic deflection
- H01J 49/22 . . . Electrostatic deflection
- H01J 49/24 . . . Vacuum systems, e.g. maintaining desired pressures

- H01J 49/26 . . . Mass spectrometers or separator tubes (isotope separation using these tubes [B01D 59/44](#))
- H01J 49/28 . . . Static spectrometers
- H01J 49/282 . . . {using electrostatic analysers}
- H01J 49/284 . . . {using electrostatic and magnetic sectors with simple focusing, e.g. with parallel fields such as Aston spectrometer}
- H01J 49/286 {with energy analysis, e.g. Castaing filter (in cathode-ray or electron-beam tubes [H01J 29/84](#); electron-or ion-optical arrangements for separating electrons or ions from an analysing or processing beam [H01J 37/05](#); micro-or spot-analysing tubes [H01J 37/252](#))}
- H01J 49/288 {using crossed electric and magnetic fields perpendicular to the beam, e.g. Wien filter}
- H01J 49/30 . . . using magnetic analysers, {e.g. Dempster spectrometer}
- H01J 49/305 {with several sectors in tandem}
- H01J 49/32 . . . using double focusing
- H01J 49/322 { with a magnetic sector of 90 degrees, e.g. Mattauch-Herzog type}
- H01J 49/324 { with an electrostatic section of 90 degrees, e.g. Nier-Johnson type}
- H01J 49/326 { with magnetic and electrostatic sectors of 90 degrees}
- H01J 49/328 { with a cycloidal trajectory by using crossed electric and magnetic fields, e.g. trochoidal type}
- H01J 49/34 . . . Dynamic spectrometers
- H01J 49/36 . . . Radio frequency spectrometers, e.g. Bennett-type spectrometers, Redhead-type spectrometers
- H01J 49/38 Omegatrons {Using ion cyclotron resonance}
- H01J 49/40 . . . Time-of-flight spectrometers ([H01J 49/36](#) takes precedence)
- H01J 49/401 { characterised by orthogonal acceleration, e.g. focusing or selecting the ions, pusher electrode}
- H01J 49/403 { characterised by the acceleration optics and/or the extraction fields}
- H01J 49/405 { characterised by the reflectron, e. g. curved field, electrode shapes}
- H01J 49/406 { with multiple reflections (electrostatic traps [H01J 49/4245](#))}
- H01J 49/408 { with multiple changes of direction, e.g. by using electric or magnetic sectors, closed-loop time-of-flight}

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| H01J 49/42 | ... | Stability-of-path spectrometers, e.g. monopole, quadrupole, multipole, farvitrons |
| H01J 49/4205 | ..... | { Device types} |
| H01J 49/421 | ..... | { Mass filters, i.e. deviating unwanted ions without trapping} |
| H01J 49/4215 | ..... | { Quadrupole mass filters (H01J 49/4225 takes precedence)} |
| H01J 49/422 | ..... | { Two-dimensional RF ion traps (ion guides without mass selection H01J 49/062)} |
| H01J 49/4225 | ..... | { Multipole linear ion traps, e.g. quadrupoles, hexapoles} |
| H01J 49/423 | ..... | { with radial ejection} |
| H01J 49/4235 | ..... | { Stacked rings or stacked plates} |
| H01J 49/424 | ..... | { Three-dimensional ion traps, i.e. comprising end-cap and ring electrodes} |
| H01J 49/4245 | ..... | { Electrostatic ion traps (H01J 49/422 takes precedence; multi-reflection time of flight spectrometers H01J 49/40R1)} |
| H01J 49/425 | ..... | { with a logarithmic radial electric potential, e.g. orbitraps} |
| H01J 49/4255 | ..... | { with particular constructional features} |
| H01J 49/426 | ..... | { Methods for controlling ions} |
| H01J 49/4265 | ..... | { Controlling the number of trapped ions, preventing space charge effects} |
| H01J 49/427 | ..... | { Ejection and selection methods} |
| H01J 49/4275 | ..... | { Applying a non-resonant auxiliary oscillating voltage, e.g. parametric excitation} |
| H01J 49/428 | ..... | { Applying a notched broadband signal} |
| H01J 49/4285 | ..... | { Applying a resonant signal, e.g. selective resonant ejection matching the secular frequency of ions (H01J 49/429 , H01J 49/428 take precedence)} |
| H01J 49/429 | ..... | { Scanning an electric parameter, e.g. voltage amplitude or frequency} |
| H01J 49/4295 | ..... | { Storage methods} |
| H01J 49/44 | . | Energy spectrometers, e.g. alpha-, beta-spectrometers |
| H01J 49/443 | .. | {Dynamic spectrometers} |
| H01J 49/446 | ... | {Time-of-flight spectrometers} |
| H01J 49/46 | .. | Static spectrometers |
| H01J 49/463 | ... | {using static magnetic fields} |
| H01J 49/466 | ... | {using crossed electric and magnetic fields perpendicular to the beam, e.g. Wien filter (see also H01J 49/288)} |
| H01J 49/48 | ... | using electrostatic analysers, e.g. cylindrical sector, Wien filter |
| H01J 49/482 | .... | {with cylindrical mirrors} |
| H01J 49/484 | .... | {with spherical mirrors} |
| H01J 49/486 | .... | { with plane mirrors, i.e uniform field} |
| H01J 49/488 | .... | {with retarding grids} |

Discharge lamps

H01J 61/00 Gas- or vapour-discharge lamps (use for sterilising milk products [A23C](#); use for

medical purposes [A61N 5/00](#); use for disinfecting water [C02F](#) ; use for lighting [F21](#); {use for advertising [G09F](#)}; circuits therefor [H05B](#); arc lamps with consumable electrodes [H05B](#); electro-luminescent lamps [H05B](#))

- H01J 61/02 . Details
- H01J 61/025 .. {Associated optical elements}
- H01J 61/04 .. Electrodes (for igniting [H01J 61/54](#)); Screens ; Shields
- H01J 61/045 ... {Thermic screens or reflectors (heat-reflecting coatings on the wall of the vessel [H01J 61/35](#))}
- H01J 61/06 ... Main electrodes
- H01J 61/067 for low-pressure discharge lamps
- H01J 61/0672 {characterised by the construction of the electrode}
- H01J 61/0675 {characterised by the material of the electrode}
- H01J 61/0677 {characterised by the electron emissive material}
- H01J 61/073 for high-pressure discharge lamps
- H01J 61/0732 {characterised by the construction of the electrode}
- H01J 61/0735 {characterised by the material of the electrode}
- H01J 61/0737 {characterised by the electron emissive material}
- H01J 61/09 Hollow cathodes
- H01J 61/10 ... Shields, screens, or guides for influencing the discharge
- H01J 61/103 {Shields, screens or guides arranged to extend the discharge path ([H01J 61/106](#) takes precedence)}
- H01J 61/106 {using magnetic means}
- H01J 61/12 .. Selection of substances for gas fillings; Specified operating pressure or temperature
- H01J 61/125 ... {having an halogenide as principal component}
- H01J 61/14 ... having one or more carbon compounds as the principal constituents
- H01J 61/16 ... having helium, argon, neon, krypton, or xenon as the principle constituent
- H01J 61/18 ... having a metallic vapour as the principal constituent
- H01J 61/20 mercury vapour
- H01J 61/22 vapour of an alkali metal
- H01J 61/24 .. Means for obtaining or maintaining the desired pressure within the vessel
- H01J 61/26 ... Means for absorbing or adsorbing gas, e.g. by gettering; Means for preventing blackening of the envelope
- H01J 61/28 ... Means for producing, introducing, or replenishing gas or vapour during operation of the lamp
- H01J 61/30 .. Vessels; Containers
- H01J 61/302 ... {characterised by the material of the vessel}
- H01J 61/305 ... {Flat vessels or containers}
- H01J 61/307 {with folded elongated discharge path}
- H01J 61/32 ... Special longitudinal shape, e.g. for advertising purposes {([H01J 61/305](#) takes precedence)}
- H01J 61/322 {Circular lamps}

- H01J 61/325 {U-shaped lamps}
- H01J 61/327 {"Compact"-lamps, i.e. lamps having a folded discharge path}
- H01J 61/33 . . . Special shape of cross-section, e.g. for producing cool spot
- H01J 61/34 . . . Double-wall vessels or containers
- H01J 61/35 . . . provided with coatings on the walls thereof; Selection of materials for the coatings (using coloured coatings [H01J 61/40](#); using luminescent coatings [H01J 61/42](#))
- H01J 61/36 . . . Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors
- H01J 61/361 . . . {Seals between parts of vessel}
- H01J 61/363 {End-disc seals or plug seals}
- H01J 61/365 {Annular seals disposed between the ends of the vessel ([H01J 61/363](#) takes precedence)}
- H01J 61/366 . . . {Seals for leading-in conductors}
- H01J 61/368 {Pinched seals or analogous seals}
- H01J 61/38 . . . Devices for influencing the colour or wavelength of the light
- H01J 61/40 . . . by light filters; by coloured coatings in or on the envelope
- H01J 61/42 . . . by transforming the wavelength of the light by luminescence
- H01J 61/44 Devices characterised by the luminescent material ([luminescent materials C09K 11/00](#))
- H01J 61/46 Devices characterised by the binder or other non-luminescent constituent of the luminescent material, e.g. for obtaining desired pouring or drying properties
- H01J 61/48 Separate coatings of different luminous materials
- H01J 61/50 . . . Auxiliary parts or solid material within the envelope for reducing risk of explosion upon breakage of the envelope, e.g. for use in mines
- H01J 61/52 . . . Cooling arrangements; Heating arrangements; Means for circulating gas or vapour within the discharge space {(heating or cooling arrangements to promote ionisation for starting [H01J 61/54](#))}
- H01J 61/523 . . . {Heating or cooling particular parts of the lamp}
- H01J 61/526 {heating or cooling of electrodes}
- H01J 61/54 . . . Igniting arrangements, e.g. promoting ionisation for starting ([circuit arrangements H05B](#))
- H01J 61/541 . . . {using a bimetal switch}
- H01J 61/542 {and an auxiliary electrode inside the vessel}
- H01J 61/544 {and an auxiliary electrode outside the vessel}
- H01J 61/545 . . . {using an auxiliary electrode inside the vessel ([H01J 61/542](#) takes precedence)}
- H01J 61/547 . . . {using an auxiliary electrode outside the vessel ([H01J 61/544](#) takes precedence)}
- H01J 61/548 . . . {using radioactive means to promote ionisation}
- H01J 61/56 . . . One or more circuit elements structurally associated with the lamp
- H01J 61/58 . . . Lamps with both liquid anode and liquid cathode
- H01J 61/60 . . . Lamps in which the discharge space is substantially filled with mercury before ignition
- H01J 61/62 . . . Lamps with gaseous cathode, e.g. plasma cathode

- H01J 61/64 . Cathode glow lamps ([designed as tuning or voltage indicators H01J 17/40](#))
- H01J 61/66 .. having one or more specially shaped cathodes, e.g. for advertising purposes
{[alphanumeric](#)}
- H01J 61/68 . Lamps in which the main discharge is between parts of a current-carrying guide, e.g. halo lamp
- H01J 61/70 . Lamps with low-pressure unconfined discharge {[having a cold pressure < 400 Torr](#)}
- H01J 61/72 .. having a main light-emitting filling of easily vaporisable metal vapour, e.g. mercury
- H01J 61/74 .. having a main light-emitting filling of difficult vaporisable metal vapour, e.g. sodium
- H01J 61/76 .. having a filling of permanent gas or gases only
- H01J 61/78 ... with cold cathode; with cathode heated only by discharge, e.g. high-tension lamp for advertising
- H01J 61/80 .. Lamps suitable only for intermittent operation, e.g. flash lamp
- H01J 61/82 . Lamps with high-pressure unconfined discharge {[having a cold pressure > 400 Torr](#)}
- H01J 61/822 .. {[High-pressure mercury lamps](#)}
- H01J 61/825 .. {[High-pressure sodium lamps](#)}
- H01J 61/827 .. {[Metal halide arc lamps](#)}
- H01J 61/84 . Lamps with discharge constricted by high pressure
- H01J 61/86 .. with discharge additionally constricted by close spacing of electrodes, e.g. for optical projection
- H01J 61/88 .. with discharge additionally constricted by envelope
- H01J 61/90 .. Lamps suitable only for intermittent operation, e.g. flash lamp
- H01J 61/92 . Lamps with more than one main discharge path
- H01J 61/94 .. Paths producing light of different wavelengths, e.g. for simulating daylight
- H01J 61/95 . Lamps with control electrode for varying intensity or wavelength of the light, e.g. for producing modulated light
- H01J 61/96 . Lamps with light-emitting discharge path and separately-heated incandescent body within a common envelope, e.g. for simulating daylight ([lamps with filament heated only by non-luminous discharge H01K](#))
- H01J 61/98 . Lamps with closely spaced electrodes heated to incandescence by light-emitting discharge, e.g. tungsten arc lamp
- H01J 63/00** **Cathode-ray or electron-stream lamps** ([flying-spot tubes H01J 31/10](#); [magic-eye tuning indicators H01J 31/14](#); [lamps with incandescent body heated by the ray or stream H01K](#)){[see also H01J 29/00](#)}
- H01J 63/02 . Details, e.g. electrode, gas filling, shape of vessel
- H01J 63/04 .. Vessels provided with luminescent coatings; Selection of materials for the coatings
- H01J 63/06 . Lamps with luminescent screen excited by the ray or stream

- H01J 63/08 . Lamps with gas plasma excited by the ray or stream
- H01J 65/00 Lamps without any electrode inside the vessel; Lamps with at least one main electrode outside the vessel**
- H01J 65/04 . Lamps in which a gas filling is excited to luminesce by an external electromagnetic field or by external corpuscular radiation, e.g. for indicating {plasma display panels}
- H01J 65/042 .. {by an external electromagnetic field}
- H01J 65/044 ... {the field being produced by a separate microwave unit}
- H01J 65/046 ... {the field being produced by using capacitive means around the vessel}
- H01J 65/048 ... {the field being produced by using an excitation coil}
- H01J 65/06 . Lamps in which a gas filling is excited to luminesce by radioactive material structurally associated with the lamp, e.g. inside the vessel
- H01J 65/08 . Lamps in which a screen or coating is excited to luminesce by radioactive material located inside the vessel {(direct conversion of radiation energy from radioactive sources into light [G21H 3/02](#))}
- H01J 99/00 Subject matter not provided for in other groups of this subclass**
- H01J 2201/00 Electrodes common to discharge tubes**
- H01J 2201/02 . Arrangements for eliminating deleterious effects
- H01J 2201/025 .. charging
- H01J 2201/19 . Thermionic cathodes
- H01J 2201/193 .. Thin film cathodes
- H01J 2201/196 .. Emission assisted by other physical processes, e.g. field- or photo emission
- H01J 2201/28 . Heaters for thermionic cathodes
- H01J 2201/2803 .. Characterised by the shape or size
- H01J 2201/2807 ... Block
- H01J 2201/281 ... Cage-like construction
- H01J 2201/2814 being a mesh-like network
- H01J 2201/2817 ... Rods
- H01J 2201/2821 ... Envelope or cross-section
- H01J 2201/2825 being oval or elliptic
- H01J 2201/2828 being rectangular or square
- H01J 2201/2832 being circular
- H01J 2201/2835 ... Folded
- H01J 2201/2839 Hair-pin or simple bend
- H01J 2201/2842 ... Conic

| | | |
|-----------------|-------|--|
| H01J 2201/2846 | ... | Loop |
| H01J 2201/285 | ... | Plurality of elements |
| H01J 2201/2853 | ... | Serpentine |
| H01J 2201/2857 | .... | being coiled |
| H01J 2201/286 | .... | being looped |
| H01J 2201/2864 | ... | Ribbon or bar |
| H01J 2201/2867 | ... | Spiral or helix |
| H01J 2201/2871 | .... | being flattened |
| H01J 2201/2875 | .... | being double, reverse helix or interwoven |
| H01J 2201/2878 | ... | Thin film or film-like |
| H01J 2201/2882 | ... | Variable winding density |
| H01J 2201/2885 | ... | Twisted |
| H01J 2201/2889 | .. | Characterised by material |
| H01J 2201/2892 | .. | Coatings |
| H01J 2201/2896 | ... | Insulating layers |
| H01J 2201/30 | . | Cold cathodes |
| H01J 2201/304 | .. | Field emission cathodes |
| H01J 2201/30403 | ... | characterised by the emitter shape |
| H01J 2201/30407 | .... | Micro-engineered point emitters |
| H01J 2201/30411 | ..... | conical shaped, e.g. Spindt type |
| H01J 2201/30415 | ..... | needle shaped |
| H01J 2201/30419 | .... | Pillar shaped emitters |
| H01J 2201/30423 | .... | Micro-engineered edge emitters |
| H01J 2201/30426 | .... | Coatings on the emitter surface, e.g. with low work function materials |
| H01J 2201/3043 | .... | Fibres |
| H01J 2201/30434 | .... | Nanotubes |
| H01J 2201/30438 | .... | Particles |
| H01J 2201/30442 | .... | Whiskers |
| H01J 2201/30446 | ... | characterised by the emitter material |
| H01J 2201/30449 | .... | Metals and metal alloys |
| H01J 2201/30453 | .... | Carbon types |
| H01J 2201/30457 | ..... | Diamond |
| H01J 2201/30461 | ..... | Graphite |
| H01J 2201/30465 | ..... | Fullerenes |
| H01J 2201/30469 | ..... | Carbon nanotubes (CNTs) |
| H01J 2201/30473 | ..... | Amorphous carbon |
| H01J 2201/30476 | ..... | Diamond-like carbon (DLC) |
| H01J 2201/3048 | .... | Semiconductor materials |
| H01J 2201/30484 | .... | Carbides |
| H01J 2201/30488 | .... | Nitrides |
| H01J 2201/30492 | .... | Borides |

- H01J 2201/30496 Oxides
- H01J 2201/306 .. Ferroelectric cathodes
- H01J 2201/308 .. Semiconductor cathodes, e.g. having PN junction layers
- H01J 2201/312 .. having an electric field perpendicular to the surface thereof
- H01J 2201/3125 . . . Metal-insulator-Metal (MIM) emission type cathodes
- H01J 2201/316 .. having an electric field parallel to the surface thereof, e.g. thin film cathodes
- H01J 2201/3165 . . . Surface conduction emission type cathodes
- H01J 2201/317 .. combined with other synergetic effects, e.g. secondary, photo- or thermal emission
- H01J 2201/319 .. Circuit elements associated with the emitters by direct integration
- H01J 2201/3195 . . . Resistive members, e.g. resistive layers

- H01J 2201/32 . Secondary emission electrodes

- H01J 2201/34 . Photoemissive electrodes
- H01J 2201/342 .. Cathodes
- H01J 2201/3421 . . . Composition of the emitting surface
- H01J 2201/3423 Semiconductors, e.g. GaAs, NEA emitters
- H01J 2201/3425 Metals, metal alloys
- H01J 2201/3426 Alkaline metal compounds, e.g. Na-K-Sb
- H01J 2201/3428 Organo-metallic compounds, e.g. Ferrocene

H01J 2203/00 Electron or ion optical arrangements common to discharge tubes or lamps

- H01J 2203/02 . Electron guns
- H01J 2203/0204 .. using cold cathodes, e.g. field emission cathodes
- H01J 2203/0208 . . . Control electrodes
- H01J 2203/0212 Gate electrodes
- H01J 2203/0216 characterised by the form or structure
- H01J 2203/022 Shapes or dimensions of gate openings
- H01J 2203/0224 Arrangement of gate openings
- H01J 2203/0228 Curved/extending upwardly
- H01J 2203/0232 characterised by the material
- H01J 2203/0236 Relative position to the emitters, cathodes or substrates
- H01J 2203/024 Focusing electrodes
- H01J 2203/0244 characterised by the form or structure
- H01J 2203/0248 Shapes or dimensions of focusing electrode openings
- H01J 2203/0252 Arrangement of focusing electrode openings
- H01J 2203/0256 characterised by the material
- H01J 2203/026 Relative position to the gateelectrodes, emitters, cathodes or substrates
- H01J 2203/0264 In the same plane as the gate electrodes or cathodes
- H01J 2203/0268 . . . Insulation layer

- H01J 2203/0272 for gate electrodes
- H01J 2203/0276 for focusing electrodes
- H01J 2203/028 characterised by the shape
- H01J 2203/0284 Dimensions of openings
- H01J 2203/0288 characterised by the material
- H01J 2203/0292 . . . Potentials applied to the electrodes
- H01J 2203/0296 . . Spin-polarised beams

- H01J 2203/04 . Ion guns

H01J 2209/00 Apparatus and processes for manufacture of discharge tubes

- H01J 2209/01 . Generalised techniques
- H01J 2209/012 . . Coating
- H01J 2209/015 . . . Machines therefor
- H01J 2209/017 . . Cleaning

- H01J 2209/02 . Manufacture of cathodes
- H01J 2209/022 . . Cold cathodes
- H01J 2209/0223 . . . Field emission cathodes
- H01J 2209/0226 Sharpening or resharpening of emitting point or edge

- H01J 2209/18 . Assembling together the component parts of the discharge tube
- H01J 2209/185 . . Machines therefor, e.g. electron gun assembling devices

- H01J 2209/236 . Manufacture of magnetic deflecting devices
- H01J 2209/2363 . . Coils
- H01J 2209/2366 . . . Machines therefor, e.g. winding, forming, welding, or the like

- H01J 2209/26 . Sealing parts of the vessel to provide a vacuum enclosure
- H01J 2209/261 . . Apparatus used for sealing vessels, e.g. furnaces, machines or the like
- H01J 2209/262 . . . means for applying sealing materials, e.g. frit paste dispensers
- H01J 2209/264 . . Materials for sealing vessels, e.g. frit glass compounds, resins or structures
- H01J 2209/265 . . Surfaces for sealing vessels
- H01J 2209/267 . . . shaped surfaces or flanges
- H01J 2209/268 . . . treated surfaces and surface preparations, e.g. to improve adhesion

- H01J 2209/38 . Control of maintenance of pressure in the vessel
- H01J 2209/383 . . Vacuum pumps
- H01J 2209/385 . . Gettering
- H01J 2209/3855 . . . Getter materials
- H01J 2209/387 . . Gas filling
- H01J 2209/389 . . Degassing
- H01J 2209/3893 . . . by a discharge

- H01J 2209/3896 . . . by heating
- H01J 2209/46 . Handling of tube components during manufacture
- H01J 2209/463 . . Identifying or selecting component pieces
- H01J 2209/466 . . . Marking, e.g. bar-codes

- H01J 2211/00** **Plasma display panels with alternate current induction of the discharge, e.g. AC-PDPs (plasma display panels making use of direct current T01J217)**

- H01J 2211/10 . AC-PDPs with at least one main electrode being out of contact with the plasma
- H01J 2211/12 . . with main electrodes provided on both sides of the discharge space
- H01J 2211/14 . . with main electrodes provided only on one side of the discharge space
- H01J 2211/16 . . with main electrodes provided inside or on the side face of the spacers
- H01J 2211/18 . . containing a plurality of independent closed structures for containing the gas, e.g. plasma tube array [PTA] display panels

- H01J 2211/20 . Constructional details
- H01J 2211/22 . . Electrodes
- H01J 2211/225 . . . Material of electrodes
- H01J 2211/24 . . . Sustain electrodes or scan electrodes
- H01J 2211/245 Shape, e.g. cross section or pattern
- H01J 2211/26 . . . Address electrodes
- H01J 2211/265 Shape, e.g. cross section or pattern
- H01J 2211/28 . . . Auxiliary electrodes, e.g. priming electrodes or trigger electrodes
- H01J 2211/30 . . . Floating electrodes
- H01J 2211/32 . . . Disposition of the electrodes
- H01J 2211/323 Mutual disposition of electrodes
- H01J 2211/326 Disposition of electrodes with respect to cell parameters ([H01J 2211/323 takes precedence](#)), e.g. electrodes within the ribs
- H01J 2211/34 . . Vessels, containers or parts thereof, e.g. substrates
- H01J 2211/36 . . . Spacers, barriers, ribs, partitions or the like
- H01J 2211/361 characterized by the shape
- H01J 2211/363 Cross section of the spacers
- H01J 2211/365 Pattern of the spacers
- H01J 2211/366 characterized by the material
- H01J 2211/368 Dummy spacers, e.g. in a non display region
- H01J 2211/38 . . . Dielectric or insulating layers
- H01J 2211/40 . . . Layers for protecting or enhancing the electron emission, e.g. MgO layers
- H01J 2211/42 . . . Fluorescent layers
- H01J 2211/44 . . . Optical arrangements or shielding arrangements, e.g. filters or lenses
- H01J 2211/442 Light reflecting means; Anti-reflection means
- H01J 2211/444 Means for improving contrast or colour purity, e.g. black matrix or light shielding means
- H01J 2211/446 Electromagnetic shielding means; Antistatic means

- H01J 2211/448 Near infrared shielding means
- H01J 2211/46 .. Connecting or feeding means, e.g. leading-in conductors
- H01J 2211/48 .. Sealing, e.g. seals specially adapted for leading-in conductors
- H01J 2211/50 .. Filling, e.g. selection of gas mixture
- H01J 2211/52 .. Means for absorbing or adsorbing the gas mixture, e.g. by gettering
- H01J 2211/54 .. Means for exhausting the gas
- H01J 2211/62 .. Circuit arrangements ([circuits or methods for driving PDP's G09G 3/28](#))
- H01J 2211/66 .. Cooling arrangements ([cooling or supporting means not being part of the tube H05K](#))

H01J 2217/00 **Gas-filled discharge tubes** ([H01J 2211/00](#) takes precedence)

- H01J 2217/04 . Electrodes ([for display panels not making use of alternating current H01J 2217/492](#); [for discharge tubes in general H01J 2201/00](#))
- H01J 2217/06 .. Cathodes
 - H01J 2217/062 ... thermionic
 - H01J 2217/065 ... heated by the discharge
 - H01J 2217/067 ... Cold cathodes
- H01J 2217/10 .. Anodes
- H01J 2217/12 .. Control electrodes

- H01J 2217/38 . Cold-cathode tubes
 - H01J 2217/40 .. Gas discharge switches
 - H01J 2217/402 ... Multiple switches
 - H01J 2217/4025 for addressing electro-optical devices, i.e. LCD`s
 - H01J 2217/49 .. Display panels, e.g. not making use of alternating current (**H01J 211/10** takes precedence)
 - H01J 2217/491 ... characterised by problems peculiar to plasma displays
 - H01J 2217/4915 Luminosity
 - H01J 2217/492 ... Details
 - H01J 2217/49207 Electrodes
 - H01J 2217/49214 Shape
 - H01J 2217/49221 Mutual disposition
 - H01J 2217/49228 Crossed electrodes
 - H01J 2217/49235 Side-by-side electrodes
 - H01J 2217/49242 Auxiliary electrodes
 - H01J 2217/4925 Mounting, supporting, spacing
 - H01J 2217/49257 Means for isolating electrodes from the discharge, e.g. dielectric layers
 - H01J 2217/49264 Vessels
 - H01J 2217/49271 Spacers between front and back panels
 - H01J 2217/49278 Coatings (**T01J 217/492C6** takes precedence)]
 - H01J 2217/49285 Associated optical means ([combined with electromagnetic screens T01J 217/492C6](#))

- H01J 2217/49292 Filters
- H01J 2217/494 A.C. panels
- H01J 2217/498 Hybrid panels (AC and DC)

H01J 2223/00 **Details of transit-time tubes of the types covered by group [H01J 2225/00](#)**

- H01J 2223/005 Cooling methods or arrangements
- H01J 2223/02 Electrodes; Magnetic control means; Screens
- H01J 2223/027 Collectors
- H01J 2223/0275 Multistage collectors
- H01J 2223/033 Collector cooling devices
- H01J 2223/04 Cathodes
- H01J 2223/05 having a cylindrical emissive surface, e.g. cathodes for magnetrons
- H01J 2223/06 Electron or ion guns
- H01J 2223/065 producing a solid cylindrical beam
- H01J 2223/07 producing a hollow cylindrical beam
- H01J 2223/075 Magnetron injection guns
- H01J 2223/08 Focusing arrangements, e.g. for concentrating stream of electrons, for preventing spreading of stream
- H01J 2223/083 Electrostatic focusing arrangements
- H01J 2223/087 Magnetic focusing arrangements
- H01J 2223/0873 with at least one axial- field reversal along the interaction space, e.g. P.P.M. focusing
- H01J 2223/0876 with arrangements improving the linearity and homogeneity of the axial field, e.g. field straightener
- H01J 2223/09 Electric system for directing or deflecting the discharge along a desired path, e.g. E-type
- H01J 2223/10 Magnet systems for directing or deflecting the discharge along a desired path, e.g. a spiral path
- H01J 2223/11 Means for reducing noise
- H01J 2223/12 Vessels; Containers
- H01J 2223/14 Leading-in arrangements; Seals therefor
- H01J 2223/15 Means for preventing wave energy leakage structurally associated with tube leading-in arrangements, e.g. filters, chokes, attenuating devices
- H01J 2223/16 Circuit elements, having distributed capacitance and inductance, structurally associated with the tube and interacting with the discharge
- H01J 2223/165 Manufacturing processes or apparatus therefore
- H01J 2223/18 Resonators
- H01J 2223/20 Cavity resonators; Adjustment or tuning thereof
- H01J 2223/207 Tuning of single resonator
- H01J 2223/213 Simultaneous tuning of more than one resonator, e.g. resonant cavities of a magnetron

- H01J 2223/22 . . . Connections between resonators, e.g. strapping for connecting resonators of a magnetron
- H01J 2223/24 . . . Slow-wave structures, e.g. delay systems
- H01J 2223/26 . . . Helical slow-wave structures; Adjustment therefor
- H01J 2223/27 Helix-derived slow-wave structures
- H01J 2223/28 . . . Interdigital slow-wave structures; Adjustment therefor
- H01J 2223/30 . . . Damping arrangements associated with slow-wave structures, e.g. for suppression of unwanted oscillations

- H01J 2223/34 . . . Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

- H01J 2223/36 . . . Coupling devices having distributed capacitance and inductance, structurally associated with the tube, for introducing or removing wave energy
 - H01J 2223/38 . . . to or from the discharge
 - H01J 2223/40 . . . to or from the interaction circuit
 - H01J 2223/42 . . . the interaction circuit being a helix or a helix-derived slow-wave structure
 - H01J 2223/44 . . . Rod-type coupling devices
 - H01J 2223/46 . . . Loop coupling devices
 - H01J 2223/48 . . . for linking interaction circuit with coaxial lines; Devices of the coupled helices type
 - H01J 2223/50 the interaction circuit being a helix or derived from a helix
 - H01J 2223/52 the coupled helices being disposed coaxially around one another
 - H01J 2223/54 . . . Filtering devices preventing unwanted frequencies or modes to be coupled to, or out of, the interaction circuit; Prevention of high frequency leakage in the environment

- H01J 2225/00 Transit-time tubes, e.g. Klystrons, travelling-wave tubes, magnetrons**

- H01J 2225/005 . . . Gas-filled transit-time tubes

- H01J 2225/02 . . . Tubes with electron stream modulated in velocity or density in a modulator zone and thereafter giving up energy in an inducing zone, the zones being associated with one or more resonators
 - H01J 2225/025 . . . with an electron stream following a helical path
 - H01J 2225/04 . . . Tubes having one or more resonators, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly density modulation e.g. Heaff tube
 - H01J 2225/06 . . . Tubes having only one resonator, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly velocity modulation, e.g. Lüdi-Klystron
 - H01J 2225/08 with electron stream perpendicular to the axis of the resonator
 - H01J 2225/10 . . . Klystrons, i.e. tubes having two or more resonators, without reflection of the electron stream, and in which the stream is modulated mainly by velocity in the zone of the input resonator
 - H01J 2225/11 Extended interaction Klystrons
 - H01J 2225/12 with pencil-like electron stream in the axis of the resonators
 - H01J 2225/14 with tube-like electron stream coaxial with the axis of the resonators

- H01J 2225/16 . . . with pencil-like electron stream perpendicular to the axis of the resonators
- H01J 2225/18 . . . with radial or disc-like electron stream perpendicular to the axis of the resonators
- H01J 2225/20 . . . having special arrangements in the space between resonators, e.g. resistive-wall amplifier tube, space-charge amplifier tube, velocity- jump tube
- H01J 2225/22 . . Reflex Klystrons, i.e. tubes having one or more resonators, with a single reflection of the electron stream, and in which the stream is modulated mainly by velocity in the modulator zone
- H01J 2225/24 . . . in which the electron stream is in the axis of the resonator or resonators and is pencil-like before reflection
- H01J 2225/26 . . . in which the electron stream is coaxial with the axis of the resonator or resonators and is tube-like before reflection
- H01J 2225/28 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is pencil-like before reflection
- H01J 2225/30 . . . in which the electron stream is perpendicular to the axis of the resonator or resonators and is radial or disc-like before reflection
- H01J 2225/32 . . Tubes with plural reflection, e.g. Coeterier tube
- H01J 2225/34 . Travelling-wave tubes; Tubes in which a travelling wave is simulated at spaced gaps
- H01J 2225/36 . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and without magnet system producing an H-field crossing the E-field
 - H01J 2225/38 . . . the forward travelling wave being utilised
 - H01J 2225/40 . . . the backward travelling wave being utilised
- H01J 2225/42 . . Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and with a magnet system producing an H-field crossing the E-field
 - H01J 2225/44 . . . the forward travelling wave being utilised
 - H01J 2225/46 . . . the backward travelling wave being utilised
- H01J 2225/48 . . Tubes in which two electron streams of different velocities interact with one another, e.g. electron-wave tube
- H01J 2225/49 . . Tubes using the parametric principle, e.g. for parametric amplification
- H01J 2225/50 . Magnetrons, i.e. tubes with a magnet system producing an H-field crossing the E-field
- H01J 2225/52 . . with an electron space having a shape that does not prevent any electron from moving completely around the cathode or guide electrode
 - H01J 2225/54 . . . having only one cavity or other resonator, e.g. neutrode tube
 - H01J 2225/55 Coaxial cavity magnetrons
 - H01J 2225/56 with interdigital arrangements of anodes, e.g. turbator tube
 - H01J 2225/58 . . . having a number of resonators; having a composite resonator, e.g. a helix
 - H01J 2225/587 Multi-cavity magnetrons
 - H01J 2225/593 Rising-sun magnetrons
- H01J 2225/60 . . with an electron space having a shape that prevents any electron from moving completely around the cathode or guide electrode; Linear magnetrons
- H01J 2225/61 . Hybrid tubes, i.e. tubes comprising a klystron section and a travelling-wave section
- H01J 2225/62 . Strophotrons, i.e. tubes with H-field crossing the E-field and functioning with plural

- reflection
- H01J 2225/64 . Turbine tubes, i.e. tubes with H-field crossing the E-field and functioning with reversed cyclotron action
- H01J 2225/66 . Tubes with electron stream crossing itself and thereby interacting or interfering with itself
- H01J 2225/68 . Tubes specially designed to act as oscillator with positive grid and retarding field, e.g. for Barkhausen-Kurz oscillators
- H01J 2225/70 .. with resonator having distributed inductance with capacitance, e.g. Pintsch tube
- H01J 2225/72 .. in which a standing wave or a considerable part thereof is produced along an electrode, e.g. Clavier tube
- H01J 2225/74 . Tubes specially designed to act as transit-time diode oscillators, e.g. monotron
- H01J 2225/76 . Dynamic electron-multiplier tubes, e.g. Farnsworth multiplier tube, multipactor
- H01J 2225/78 . Tubes with electron stream modulated by deflection in a resonator
- H01J 2229/00** **Details of cathode ray tubes or electron beam tubes** ([H01J 2329/00](#) takes precedence)
- H01J 2229/0007 . Elimination of unwanted or stray electromagnetic effects
- H01J 2229/0015 .. Preventing or cancelling fields leaving the enclosure
- H01J 2229/0023 ... Passive means
- H01J 2229/003 .. Preventing or cancelling fields entering the enclosure
- H01J 2229/0038 ... Active means
- H01J 2229/0046 .. Preventing or cancelling fields within the enclosure
- H01J 2229/0053 ... Demagnetisation
- H01J 2229/0061 . Cooling arrangements
- H01J 2229/0069 .. Active means, e.g. fluid flow
- H01J 2229/0076 ... applied to the faceplate
- H01J 2229/0084 Translucent coolant, e.g. flowing across faceplate
- H01J 2229/0092 .. Passive means, e.g. fins, heat conductors
- H01J 2229/07 . Shadow masks
- H01J 2229/0705 .. Mounting arrangement of assembly to vessel
- H01J 2229/0711 ... Spring and plate (clip) type
- H01J 2229/0716 .. Mounting arrangements of aperture plate to frame or vessel
- H01J 2229/0722 .. Frame
- H01J 2229/0727 .. Aperture plate
- H01J 2229/0733 ... characterised by the material
- H01J 2229/0738 ... Mitigating undesirable mechanical effects
- H01J 2229/0744 Vibrations

- H01J 2229/075 ... Beam passing apertures, e.g. geometrical arrangements
- H01J 2229/0755 characterised by aperture shape
- H01J 2229/0761 Uniaxial masks having parallel slit apertures, i.e. Trinitron type
- H01J 2229/0766 ... Details of skirt or border
- H01J 2229/0772 Apertures, cut-outs, depressions, or the like
- H01J 2229/0777 ... Coatings
- H01J 2229/0783 improving thermal radiation properties
- H01J 2229/0788 ... Parameterised dimensions of aperture plate, e.g. relationships, polynomial expressions
- H01J 2229/0794 .. Geometrical arrangements, e.g. curvature

- H01J 2229/18 . Phosphor screens
- H01J 2229/183 .. multi-layer
- H01J 2229/186 .. Geometrical arrangement of phosphors

- H01J 2229/48 . Electron guns
- H01J 2229/4803 .. Electrodes
- H01J 2229/4806 ... Shield centering cups
- H01J 2229/481 ... Focusing electrodes
- H01J 2229/4813 Pre-focusing
- H01J 2229/4817 ... Accelerating electrodes
- H01J 2229/482 ... Extraction grids
- H01J 2229/4824 .. Constructional arrangements of electrodes
- H01J 2229/4827 ... Electrodes formed on surface of common cylindrical support
- H01J 2229/4831 ... Electrode supports
- H01J 2229/4834 .. Electrical arrangements coupled to electrodes, e.g. potentials
- H01J 2229/4837 ... characterised by the potentials applied
- H01J 2229/4841 Dynamic potentials
- H01J 2229/4844 .. characterised by beam passing apertures or combinations
- H01J 2229/4848 ... Aperture shape as viewed along beam axis
- H01J 2229/4851 trapezoidal
- H01J 2229/4855 with rounded end or ends
- H01J 2229/4858 parallelogram
- H01J 2229/4862 square
- H01J 2229/4865 rectangle
- H01J 2229/4868 with rounded end or ends
- H01J 2229/4872 circular
- H01J 2229/4875 oval
- H01J 2229/4879 non-symmetric about field scanning axis
- H01J 2229/4882 non-symmetric about line scanning axis
- H01J 2229/4886 polygonal
- H01J 2229/4889 cross shaped
- H01J 2229/4893 Interconnected apertures

- H01J 2229/4896 complex and not provided for
- H01J 2229/50 Plurality of guns or beams
- H01J 2229/502 Three beam guns, e.g. for colour CRTs
- H01J 2229/505 Arrays
- H01J 2229/507 Multi-beam groups, e.g. number of beams greater than number of cathodes

- H01J 2229/56 Correction of beam optics
- H01J 2229/563 Aberrations by type
- H01J 2229/5632 Spherical
- H01J 2229/5635 Astigmatism
- H01J 2229/5637 Colour purity
- H01J 2229/568 using supplementary correction devices
- H01J 2229/5681 magnetic
- H01J 2229/5682 Permanently magnetised materials, e.g. permanent magnets
- H01J 2229/5684 Magnetic materials, e.g. soft iron
- H01J 2229/5685 Cross-arms field shaper
- H01J 2229/5687 Auxiliary coils
- H01J 2229/5688 Velocity modulation

- H01J 2229/58 Electron beam control inside the vessel
- H01J 2229/581 by magnetic means
- H01J 2229/582 by electrostatic means
- H01J 2229/583 at the source
- H01J 2229/5835 cooperating with the electron gun
- H01J 2229/585 at the screen
- H01J 2229/587 between the source and the screen

- H01J 2229/70 Electron beam control outside the vessel
- H01J 2229/703 by magnetic fields
- H01J 2229/7031 Cores for field producing elements, e.g. ferrite
- H01J 2229/7032 Conductor design and distribution
- H01J 2229/7033 Winding
- H01J 2229/7035 Wires and conductors
- H01J 2229/7036 Form of conductor
- H01J 2229/7037 flat, e.g. foil, or ribbon type
- H01J 2229/7038 Coil separators and formers

- H01J 2229/86 Vessels and containers
- H01J 2229/8603 Neck or cone portions of the CRT vessel
- H01J 2229/8606 characterised by the shape
- H01J 2229/8609 Non circular cross-sections
- H01J 2229/8613 Faceplates
- H01J 2229/8616 characterised by shape

- H01J 2229/862 Parameterised shape, e.g. expression, relationship or equation
- H01J 2229/8623 .. Substrates
- H01J 2229/8626 .. Frames

- H01J 2229/863 . Passive shielding means associated with the vessel
- H01J 2229/8631 .. Coatings
- H01J 2229/8632 characterised by the material
- H01J 2229/8633 .. Meshes and patterns
- H01J 2229/8634 .. Magnetic shielding
- H01J 2229/8635 .. Antistatic shielding
- H01J 2229/8636 .. Electromagnetic shielding
- H01J 2229/8637 .. Mechanical shielding, e.g. against water or abrasion
- H01J 2229/8638 .. Ionising radiation shielding, e.g. X-rays

- H01J 2229/87 . Means for avoiding vessel implosion
- H01J 2229/875 .. Means substantially covering the output face, e.g. resin layers, protective panels

- H01J 2229/88 . Coatings
- H01J 2229/882 .. having particular electrical resistive or conductive properties
- H01J 2229/885 .. having particular electrical insulation properties
- H01J 2229/887 .. having particular X-ray shielding properties

- H01J 2229/89 . Optical components associated with the vessel
- H01J 2229/8901 .. Fixing of optical components to the vessel
- H01J 2229/8903 .. Fibre optic components
- H01J 2229/8905 .. Direction sensitive devices for controlled viewing angle
- H01J 2229/8907 .. Image projection devices
- H01J 2229/8909 .. Baffles, shutters, apertures or the like against external light
- H01J 2229/8911 Large-scale devices, e.g. foldable screens
- H01J 2229/8913 .. Anti-reflection, anti-glare, viewing angle and contrast improving treatments or devices
- H01J 2229/8915 Surface treatment of vessel or device, e.g. controlled surface roughness
- H01J 2229/8916 inside the vessel
- H01J 2229/8918 by using interference effects
- H01J 2229/892 Effect varying over surface
- H01J 2229/8922 Apparatus attached to vessel and not integral therewith
- H01J 2229/8924 .. having particular properties for protecting the vessel, e.g. against abrasion, water or shock
- H01J 2229/8926 .. Active components, e.g. LCD`s, indicators, illuminators and moving devices
- H01J 2229/8928 .. Laser CRTs
- H01J 2229/893 .. using lenses
- H01J 2229/899 .. Photographic devices ([permanent recording of images](#))

- H01J 2229/92 . Means providing or assisting electrical connection with or within the tube

- H01J 2229/922 . . within the tube
- H01J 2229/925 . . associated with the high tension (HT), e.g. anode potentials
- H01J 2229/927 . . associated with digital scanning

- H01J 2229/94 . Means for obtaining or maintaining the desired pressure within the tube

- H01J 2229/96 . Circuit elements other than coils, reactors or the like, associated with the tube
- H01J 2229/962 . . associated with the HT
- H01J 2229/964 . . associated with the deflection system
- H01J 2229/966 . . associated with the gun structure
- H01J 2229/968 . . . Resistors

H01J 2231/00 Cathode ray tubes or electron beam tubes ([H01J 2329/00](#) takes precedence)

- H01J 2231/12 . CRTs having luminescent screens
- H01J 2231/121 . . Means for indicating the position of the beam, e.g. beam indexing
- H01J 2231/123 . . . by direct current detection, e.g. collecting electrodes
- H01J 2231/125 . . with a plurality of electron guns within the tube envelope
- H01J 2231/1255 . . . two or more neck portions containing one or more guns

- H01J 2231/50 . Imaging and conversion tubes
- H01J 2231/50005 . . characterised by form of illumination
- H01J 2231/5001 . . . Photons
- H01J 2231/50015 Light
- H01J 2231/50021 Ultra-violet
- H01J 2231/50026 Infra-red
- H01J 2231/50031 . . . High energy photons
- H01J 2231/50036 X-rays
- H01J 2231/50042 . . Particles
- H01J 2231/50047 . . . Charged particles
- H01J 2231/50052 . . . Mechanical vibrations, e.g. sound
- H01J 2231/50057 . . characterised by form of output stage
- H01J 2231/50063 . . . Optical
- H01J 2231/50068 . . . Electrical
- H01J 2231/50073 Charge coupled device (CCD)
- H01J 2231/50078 Resistive anode
- H01J 2231/50084 using light or electron beam scanning
- H01J 2231/50089 . . . Having optical stage before electrical conversion
- H01J 2231/50094 Charge coupled device (CCD)
- H01J 2231/501 . . including multiplication stage
- H01J 2231/5013 . . . with secondary emission electrodes
- H01J 2231/5016 Microchannel plates (MCP)
- H01J 2231/503 . . with scanning or gating optics

- H01J 2231/5033 . . . electrostatic
- H01J 2231/5036 . . . magnetic
- H01J 2231/505 .. with non-scanning optics
- H01J 2231/5053 . . . electrostatic
- H01J 2231/5056 . . . magnetic

H01J 2235/00 X-ray tubes

- H01J 2235/02 . Electrical arrangements
- H01J 2235/023 .. Connecting of signals or tensions to or through the vessel
- H01J 2235/0233 . . . High tension
- H01J 2235/0236 . . . Indirect coupling, e.g. capacitive or inductive

- H01J 2235/06 . Cathode assembly
- H01J 2235/062 .. Cold cathodes
- H01J 2235/064 .. Movement of cathode
- H01J 2235/066 . . . Rotation
- H01J 2235/068 .. Multi-cathode assembly

- H01J 2235/08 . Targets (anodes) and X-ray converters
- H01J 2235/081 .. Target material
- H01J 2235/082 . . . Fluids, e.g. liquids, gases
- H01J 2235/083 .. Bonding or fixing with the support or substrate
- H01J 2235/084 . . . Target-substrate interlayers or structures, e.g. to control or prevent diffusion or improve adhesion
- H01J 2235/085 .. Target treatment, e.g. ageing, heating
- H01J 2235/086 .. Target geometry
- H01J 2235/087 . . . Transmission type
- H01J 2235/088 .. Laminated targets, e.g. plurality of emitting layers of unique or differing materials

- H01J 2235/10 . Drive means for anode (target) substrate
- H01J 2235/1006 .. Supports or shafts for target or substrate
- H01J 2235/1013 . . . Fixing to the target or substrate
- H01J 2235/102 . . . Materials for the shaft
- H01J 2235/1026 .. Means (motors) for driving the target (anode)
- H01J 2235/1033 . . . mounted within the vacuum vessel
- H01J 2235/104 . . . characterised by the shape
- H01J 2235/1046 .. Bearings and bearing contact surfaces
- H01J 2235/1053 . . . Retainers or races
- H01J 2235/106 . . . Dynamic pressure bearings, e.g. helical groove type
- H01J 2235/1066 . . . Treated contact surfaces, e.g. coatings
- H01J 2235/1073 . . . Magnetic bearings
- H01J 2235/108 .. Lubricants

- H01J 2235/1086 . . . liquid metals
- H01J 2235/1093 .. Measures for preventing vibration

- H01J 2235/12 . Cooling
- H01J 2235/1204 .. of the anode
- H01J 2235/1208 .. of the bearing assembly
- H01J 2235/1212 .. of the cathode
- H01J 2235/1216 .. of the vessel
- H01J 2235/122 .. of the window
- H01J 2235/1225 .. characterised by method
- H01J 2235/1229 . . . employing layers with high emissivity
- H01J 2235/1233 characterised by the material
- H01J 2235/1237 Oxides
- H01J 2235/1241 Bonding layer to substrate
- H01J 2235/1245 . . . Increasing emissive surface area
- H01J 2235/125 with interdigitated fins or slots
- H01J 2235/1254 with microscopic surface features
- H01J 2235/1258 . . . Placing objects in close proximity
- H01J 2235/1262 . . . Circulating fluids
- H01J 2235/1266 flow being via moving conduit or shaft
- H01J 2235/127 Control of flow
- H01J 2235/1275 characterised by the fluid
- H01J 2235/1279 Liquid metals
- H01J 2235/1283 in conjunction with extended surfaces (e.g. fins or ridges)
- H01J 2235/1287 Heat pipes
- H01J 2235/1291 . . . Thermal conductivity
- H01J 2235/1295 Contact between conducting bodies

- H01J 2235/16 . Vessels
- H01J 2235/161 .. Non-stationary vessels
- H01J 2235/162 . . . Rotation
- H01J 2235/163 .. shaped for a particular application
- H01J 2235/164 . . . Small cross-section, e.g. for entering in a body cavity
- H01J 2235/165 .. Shielding arrangements
- H01J 2235/166 . . . against electromagnetic radiation
- H01J 2235/167 . . . against thermal (heat) energy
- H01J 2235/168 . . . against charged particles

- H01J 2235/18 . Windows, e.g. for X-ray transmission
- H01J 2235/183 .. Multi-layer structures
- H01J 2235/186 .. used as target or X-ray converter, e.g. transmission type

- H01J 2235/20 . Arrangements for controlling gases within the X-ray tube

- H01J 2235/205 .. Gettering
- H01J 2237/00 Discharge tubes exposing object to beam, e.g. for analysis treatment, etching, imaging**
- NOTE**
- For features of general interest which may be found in other types of discharge tubes, an indexing code corresponding to general schemes T01J201 to T01J207 is given, e.g. for cathodes, vessels, cooling means or the like
- Same rules apply for manufacturing procedures (T01J209), unless really specific to the tube concerned.
- The codes in this main group are grouped according to the following principle: details common to gas or plasma discharge of the above mentioned tubes: [H01J 2237/00](#) to [T011J237/248D2](#)
 Imaging or analysing: [H01J 2237/25](#) to [H01J 2237/2857](#)
 particle beam processing: [H01J 2237/30](#) to [H01J 2237/31798](#)
 plasma processing: [H01J 2237/32](#) to **T01J 237/38C1**
- H01J 2237/002 . Cooling arrangements (of objects being observed or treated [H01J 2237/2001](#))
- H01J 2237/004 . Charge control of objects or beams
- H01J 2237/0041 .. Neutralising arrangements
- H01J 2237/0042 ... Deflection of neutralising particles
- H01J 2237/0044 ... of objects being observed or treated
- H01J 2237/0045 using secondary electrons
- H01J 2237/0047 using electromagnetic radiations, e.g. UV, X-rays, light
- H01J 2237/0048 .. Charging arrangements
- H01J 2237/006 . Details of gas supplies - e.g. in an ion source, to a beam line, to a specimen or to a workpiece, (**T01J 237/32C** takes precedence; environmental cells for electron microscopes [H01J 2237/2003](#); microscopes with environmental specimen chamber [H01J 2237/2608](#))
- H01J 2237/02 . Details
- H01J 2237/0203 .. Protection arrangements
- H01J 2237/0206 ... Extinguishing, preventing or controlling unwanted discharges
- H01J 2237/0209 ... Avoiding or diminishing effects of eddy currents
- H01J 2237/0213 ... Avoiding deleterious effects due to interactions between particles and tube elements
- H01J 2237/0216 .. Means for avoiding or correcting vibration effects
- H01J 2237/022 .. Avoiding or removing foreign or contaminating particles, debris or deposits on sample or tube
- H01J 2237/0225 ... Detecting or monitoring foreign particles
- H01J 2237/024 .. Moving components not otherwise provided for (diaphragms [H01J 2237/0458](#); objects [H01J 2237/202](#))

- H01J 2237/0245 ... Moving whole optical system relatively to object
- H01J 2237/026 .. Shields
 - H01J 2237/0262 ... electrostatic
 - H01J 2237/0264 ... magnetic
 - H01J 2237/0266 ... electromagnetic
 - H01J 2237/0268 ... Liner tubes
- H01J 2237/028 .. Particle traps

- H01J 2237/03 . Mounting, supporting, spacing or insulating electrodes
 - H01J 2237/032 .. Mounting or supporting
 - H01J 2237/036 .. Spacing
 - H01J 2237/038 .. Insulating

- H01J 2237/04 . Means for controlling the discharge
 - H01J 2237/041 .. Beam polarising means
 - H01J 2237/043 .. Beam blanking
 - H01J 2237/0432 ... High speed and short duration
 - H01J 2237/0435 ... Multi-aperture
 - H01J 2237/0437 Semiconductor substrate
 - H01J 2237/045 .. Diaphragms
 - H01J 2237/0451 ... with fixed aperture
 - H01J 2237/0453 multiple apertures
 - H01J 2237/0455 ... with variable aperture
 - H01J 2237/0456 ... Supports
 - H01J 2237/0458 movable, i.e. for changing between differently sized apertures
 - H01J 2237/047 .. Changing particle velocity
 - H01J 2237/0473 ... accelerating
 - H01J 2237/04732 with magnetic means
 - H01J 2237/04735 with electrostatic means
 - H01J 2237/04737 radio-frequency quadrupole (RFQ)
 - H01J 2237/0475 ... decelerating
 - H01J 2237/04753 with magnetic means
 - H01J 2237/04756 with electrostatic means
 - H01J 2237/049 .. Focusing means
 - H01J 2237/0492 ... Lens systems ([individual lenses H01J 2237/10](#))
 - H01J 2237/04922 electromagnetic
 - H01J 2237/04924 electrostatic
 - H01J 2237/04926 combined
 - H01J 2237/04928 Telecentric systems

- H01J 2237/05 . Arrangements for energy or mass analysis
 - H01J 2237/053 .. electrostatic
 - H01J 2237/0535 ... Mirror analyser

- H01J 2237/055 .. magnetic
- H01J 2237/057 .. Energy or mass filtering
- H01J 2237/06 . Sources
 - H01J 2237/061 .. Construction
 - H01J 2237/062 ... Reducing size of gun
 - H01J 2237/063 .. Electron sources
 - H01J 2237/06308 ... Thermionic sources
 - H01J 2237/06316 Schottky emission
 - H01J 2237/06325 ... Cold-cathode sources
 - H01J 2237/06333 Photo emission
 - H01J 2237/06341 Field emission
 - H01J 2237/0635 Multiple source, e.g. comb or array
 - H01J 2237/06358 Secondary emission
 - H01J 2237/06366 Gas discharge electron sources
 - H01J 2237/06375 ... Arrangement of electrodes
 - H01J 2237/06383 ... Spin polarised electron sources
 - H01J 2237/06391 ... Positron sources
 - H01J 2237/065 .. Source emittance characteristics
 - H01J 2237/0653 ... Intensity
 - H01J 2237/0656 ... Density
 - H01J 2237/08 .. Ion sources
 - H01J 2237/0802 ... Field ionization sources
 - H01J 2237/0805 Liquid metal sources
 - H01J 2237/0807 Gas field ion sources [GFIS]
 - H01J 2237/081 ... Sputtering sources
 - H01J 2237/0812 ... Ionized cluster beam [ICB] sources
 - H01J 2237/0815 ... Methods of ionisation
 - H01J 2237/0817 Microwaves
 - H01J 2237/082 Electron beam
 - H01J 2237/0822 ... Multiple sources
 - H01J 2237/0825 for producing different ions simultaneously
 - H01J 2237/0827 for producing different ions sequentially
 - H01J 2237/083 .. Beam forming
 - H01J 2237/0835 ... Variable cross-section or shape
- H01J 2237/10 . Lenses
 - H01J 2237/103 .. characterised by lens type
 - H01J 2237/1035 ... Immersion lens
 - H01J 2237/12 .. electrostatic
 - H01J 2237/1202 ... Associated circuits
 - H01J 2237/1205 ... Microlenses

- H01J 2237/1207 . . . Einzel lenses
- H01J 2237/121 . . . characterised by shape
- H01J 2237/1215 Annular electrodes
- H01J 2237/14 . . magnetic
- H01J 2237/1405 . . . Constructional details
- H01J 2237/141 Coils ([superconducting H01J 2237/142](#))
- H01J 2237/1415 Bores or yokes, i.e. magnetic circuit in general
- H01J 2237/142 . . . with superconducting coils

- H01J 2237/15 . Means for deflecting or directing discharge
- H01J 2237/1501 . . Beam alignment means or procedures
- H01J 2237/1502 . . Mechanical adjustments
- H01J 2237/1503 . . . Mechanical scanning
- H01J 2237/1504 . . Associated circuits
- H01J 2237/1505 . . Rotating beam around optical axis
- H01J 2237/1506 . . Tilting or rocking beam around an axis substantially at an angle to optical axis
- H01J 2237/1507 . . . dynamically, e.g. to obtain same impinging angle on whole area
- H01J 2237/1508 . . Combined electrostatic-electromagnetic means
- H01J 2237/151 . . Electrostatic means
- H01J 2237/1512 . . . Travelling wave deflectors
- H01J 2237/1514 . . . Prisms
- H01J 2237/1516 . . . Multipoles
- H01J 2237/1518 . . . for X-Y scanning
- H01J 2237/152 . . Magnetic means
- H01J 2237/1523 . . . Prisms
- H01J 2237/1526 . . . For X-Y scanning

- H01J 2237/153 . Correcting image defects, e.g. stigmators
- H01J 2237/1532 . . Astigmatism
- H01J 2237/1534 . . Aberrations
- H01J 2237/1536 . . Image distortions due to scanning
- H01J 2237/1538 . . Space charge (Boersch) effect compensation ([neutralising means H01J 2237/0041](#))

- H01J 2237/16 . Vessels ([liner tubes H01J 2237/0268](#))
- H01J 2237/162 . . Open vessel, i.e. one end sealed by object or workpiece
- H01J 2237/164 . . Particle-permeable windows
- H01J 2237/166 . . Sealing means

- H01J 2237/18 . Vacuum control means
- H01J 2237/182 . . Obtaining or maintaining desired pressure
- H01J 2237/1825 . . . Evacuating means
- H01J 2237/184 . . Vacuum locks
- H01J 2237/186 . . Valves

- H01J 2237/188 .. Differential pressure
- H01J 2237/20 . Positioning, supporting, modifying or maintaining the physical state of objects being observed or treated
- H01J 2237/2001 .. Maintaining constant desired temperature
- H01J 2237/2002 .. Controlling environment of sample
- H01J 2237/2003 ... Environmental cells
- H01J 2237/2004 Biological samples
- H01J 2237/2005 .. Seal mechanisms
- H01J 2237/2006 ... Vacuum seals
- H01J 2237/2007 .. Holding mechanisms
- H01J 2237/2008 .. specially adapted for studying electrical or magnetical properties of objects
- H01J 2237/201 .. for mounting multiple objects
- H01J 2237/202 .. Movement
- H01J 2237/20207 ... Tilt
- H01J 2237/20214 ... Rotation
- H01J 2237/20221 ... Translation
- H01J 2237/20228 Mechanical X-Y scanning
- H01J 2237/20235 Z movement or adjustment
- H01J 2237/20242 ... Eucentric movement
- H01J 2237/2025 ... Sensing velocity of translation or rotation
- H01J 2237/20257 ... Magnetic coupling
- H01J 2237/20264 ... Piezoelectric devices
- H01J 2237/20271 ... Temperature responsive devices
- H01J 2237/20278 ... Motorised movement
- H01J 2237/20285 computer-controlled
- H01J 2237/20292 ... Means for position and/or orientation registration
- H01J 2237/204 .. Means for introducing and/or outputting objects ([locks H01J 2237/184](#))
- H01J 2237/206 .. Modifying objects while observing
- H01J 2237/2062 ... Mechanical constraints
- H01J 2237/2065 ... Temperature variations ([maintaining constant desired temperature H01J 2237/2001](#))
- H01J 2237/2067 ... Surface alteration
- H01J 2237/208 .. Elements or methods for movement independent of sample stage for influencing or moving or contacting or transferring the sample or parts thereof, e.g. prober needles or transfer needles in FIB/SEM systems
- H01J 2237/21 . Focus adjustment ([lenses H01J 2237/10](#))
- H01J 2237/213 .. during electron or ion beam welding or cutting
- H01J 2237/216 .. Automatic focusing methods
- H01J 2237/22 . Treatment of data ([mixing signals H01J 2237/24495](#))
- H01J 2237/221 .. Image processing
- H01J 2237/223 ... Fourier techniques

- H01J 2237/225 . . . Displaying image using synthesised colours
- H01J 2237/226 . . . Image reconstruction
- H01J 2237/228 . . . Charged particle holography

- H01J 2237/244 . . Detection characterized by the detecting means
- H01J 2237/24405 . . Faraday cages
- H01J 2237/2441 . . Semiconductor detectors, e.g. diodes
- H01J 2237/24415 . . . X-ray
- H01J 2237/2442 Energy-dispersive (Si-Li type) spectrometer
- H01J 2237/24425 Wavelength-dispersive spectrometer
- H01J 2237/2443 . . Scintillation detectors
- H01J 2237/24435 . . Microchannel plates
- H01J 2237/2444 . . Electron Multiplier
- H01J 2237/24445 . . . using avalanche in a gas
- H01J 2237/2445 . . Photon detectors for X-rays, light, e.g. photomultipliers
- H01J 2237/24455 . . Transmitted particle detectors
- H01J 2237/2446 . . Position sensitive detectors
- H01J 2237/24465 . . . Sected detectors, e.g. quadrants
- H01J 2237/2447 . . . Imaging plates
- H01J 2237/24475 . . Scattered electron detectors
- H01J 2237/2448 . . Secondary particle detectors
- H01J 2237/24485 . . Energy spectrometers
- H01J 2237/2449 . . Detector devices with moving charges in electric or magnetic fields
- H01J 2237/24495 . . Signal processing, e.g. mixing of two or more signals

- H01J 2237/245 . . Detection characterised by the variable being measured
- H01J 2237/24507 . . Intensity, dose or other characteristics of particle beams or electromagnetic radiation
- H01J 2237/24514 . . . Beam diagnostics including control of the parameter or property diagnosed ([H01J 2237/30472 takes precedence](#))
- H01J 2237/24521 Beam diameter
- H01J 2237/24528 Direction of beam or parts thereof in view of the optical axis, e.g. beam angle, angular distribution, beam divergence, beam convergence or beam landing angle on sample or workpiece ([means for deflecting or directing discharge H01J 2237/15](#))
- H01J 2237/24535 Beam current
- H01J 2237/24542 Beam profile
- H01J 2237/2455 . . . Polarisation ([electromagnetic beams](#))
- H01J 2237/24557 . . . Spin polarisation (particles)
- H01J 2237/24564 . . Measurements of electric or magnetic variables, e.g. voltage, current, frequency
- H01J 2237/24571 . . Measurements of non-electric or non-magnetic variables
- H01J 2237/24578 . . . Spatial variables, e.g. position, distance
- H01J 2237/24585 . . . Other variables, e.g. energy, mass, velocity, time, temperature
- H01J 2237/24592 . . Inspection and quality control of devices

- H01J 2237/248 . Components associated with the control of the tube
- H01J 2237/2482 .. Optical means
- H01J 2237/2485 .. Electric or electronic means
- H01J 2237/2487 ... using digital signal processors

- H01J 2237/25 . Tubes for localised analysis using electron or ion beams
- H01J 2237/2505 .. characterised by their application
- H01J 2237/2511 ... Auger spectrometers
- H01J 2237/2516 ... Secondary particles mass or energy spectrometry
- H01J 2237/2522 of electrons ([ESCA, XPS](#))
- H01J 2237/2527 Ions (SIMS)
- H01J 2237/2533 Neutrals (SNMS)
- H01J 2237/2538 ... Low energy electron microscopy (LEEM)
- H01J 2237/2544 Diffraction (LEED)
- H01J 2237/255 Reflection diffraction (RHEED)
- H01J 2237/2555 ... Microprobes, i.e. particle-induced X-ray spectrometry
- H01J 2237/2561 electron
- H01J 2237/2566 ion
- H01J 2237/2572 proton
- H01J 2237/2577 atomic
- H01J 2237/2583 ... using tunnel effects, e.g. STM, AFM
- H01J 2237/2588 ... Lorenz microscopy ([magnetic field measurement](#))
- H01J 2237/2594 ... Measuring electric fields or potentials

- H01J 2237/26 . Electron or ion microscopes
- H01J 2237/2602 .. Details
- H01J 2237/2605 ... operating at elevated pressures, e.g. atmosphere
- H01J 2237/2608 with environmental specimen chamber ([environmental cells](#)
[H01J 2237/2003](#))
- H01J 2237/2611 .. Stereoscopic measurements and/or imaging
- H01J 2237/2614 .. Holography or phase contrast, phase related imaging in general, e.g. phase plates
- H01J 2237/2617 .. Comparison or superposition of transmission images; Moirè
- H01J 2237/262 .. Non-scanning techniques
- H01J 2237/2623 ... Field-emission microscopes
- H01J 2237/2626 Pulsed source
- H01J 2237/28 .. Scanning microscopes
- H01J 2237/2801 ... Details
- H01J 2237/2802 ... Transmission microscopes
- H01J 2237/2803 ... characterised by the imaging method
- H01J 2237/2804 Scattered primary beam
- H01J 2237/2805 Elastic scattering
- H01J 2237/2806 Secondary charged particle

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|-----------------|-------|--|
| H01J 2237/2807 | | X-rays |
| H01J 2237/2808 | | Cathodoluminescence |
| H01J 2237/2809 | ... | characterised by the imaging problems involved |
| H01J 2237/281 | .... | Bottom of trenches or holes |
| H01J 2237/2811 | .... | Large objects |
| H01J 2237/2812 | ... | Emission microscopes |
| H01J 2237/2813 | ... | characterised by the application |
| H01J 2237/2814 | .... | Measurement of surface topography |
| H01J 2237/2815 | ..... | Depth profile |
| H01J 2237/2816 | ..... | Length |
| H01J 2237/2817 | .... | Pattern inspection |
| H01J 2237/2818 | ... | Scanning tunnelling microscopes |
| H01J 2237/282 | .. | Determination of microscope properties |
| H01J 2237/2823 | ... | Resolution |
| H01J 2237/2826 | ... | Calibration (for object processing apparatus H01J 2237/30433) |
| H01J 2237/285 | .. | Emission microscopes |
| H01J 2237/2852 | ... | Auto-emission (<i>i.e.</i> field-emission) |
| H01J 2237/2855 | ... | Photo-emission |
| H01J 2237/2857 | ... | Particle bombardment induced emission |
| H01J 2237/30 | . | Electron or ion beam tubes for processing objects |
| H01J 2237/303 | .. | Electron or ion optical systems |
| H01J 2237/304 | .. | Controlling tubes |
| H01J 2237/30405 | ... | Details |
| H01J 2237/30411 | .... | using digital signal processors (DSP) |
| H01J 2237/30416 | .... | Handling of data (for lithography H01J 37/3174) |
| H01J 2237/30422 | ..... | Data compression |
| H01J 2237/30427 | .... | using neural networks or fuzzy logic |
| H01J 2237/30433 | ... | System calibration (for microscopes H01J 2237/2826) |
| H01J 2237/30438 | .... | Registration |
| H01J 2237/30444 | ..... | Calibration grids |
| H01J 2237/3045 | .... | Deflection calibration (deflecting in general H01J 2237/15 ; specific to material treating H01J 2237/30483) |
| H01J 2237/30455 | ... | Correction during exposure |
| H01J 2237/30461 | .... | pre-calculated |
| H01J 2237/30466 | ... | Detecting endpoint of process (for plasma apparatus T01J 237/325F2 , for sputtering apparatus T01J 237/36C2) |
| H01J 2237/30472 | ... | Controlling the beam |
| H01J 2237/30477 | .... | Beam diameter |
| H01J 2237/30483 | .... | Scanning |
| H01J 2237/30488 | ..... | Raster scan |
| H01J 2237/30494 | ..... | Vector scan |
| H01J 2237/31 | .. | Processing objects on a macro-scale |

| | | |
|-----------------|-------|---|
| H01J 2237/3104 | ... | Welding |
| H01J 2237/3109 | ... | Cutting |
| H01J 2237/3114 | ... | Machining |
| H01J 2237/3118 | ... | Drilling |
| H01J 2237/3123 | ... | Casting |
| H01J 2237/3128 | ... | Melting |
| H01J 2237/3132 | ... | Evaporating |
| H01J 2237/3137 | ..... | Plasma-assisted co-operation |
| H01J 2237/3142 | ... | Ion plating |
| H01J 2237/3146 | ..... | Ion beam bombardment sputtering |
| H01J 2237/3151 | ... | Etching |
| H01J 2237/3156 | ... | Curing |
| H01J 2237/316 | ... | Changing physical properties |
| H01J 2237/3165 | ... | Changing chemical properties |
| H01J 2237/317 | .. | Processing objects on a micro-scale |
| H01J 2237/31701 | ... | Ion implantation |
| H01J 2237/31703 | ..... | Dosimetry |
| H01J 2237/31705 | ..... | Impurity or contaminant control |
| H01J 2237/31706 | ..... | characterised by the area treated |
| H01J 2237/31708 | ..... | unpatterned |
| H01J 2237/3171 | ..... | patterned |
| H01J 2237/31711 | ..... | using mask |
| H01J 2237/31713 | ..... | Focused ion beam |
| H01J 2237/31715 | ... | Particle-beam lithography, e.g. electron beam lithography WARNING This group and subgroups thereof are not complete, see provisionally 237/317L and subgroups |
| H01J 2237/31716 | ..... | Production of exposure radiation, e.g. types of radiation, radiation sources |
| H01J 2237/31718 | ..... | Illumination systems for mask or workpiece |
| H01J 2237/3172 | ..... | Systems for imaging mask onto workpiece |
| H01J 2237/31722 | ..... | Imaging systems for maskless apparatus, e.g. direct writing with a scanning beam |
| H01J 2237/31723 | ..... | Imaging strategies, e.g. overlapping exposures, stitching |
| H01J 2237/31725 | ..... | Testing and control, e.g. beam control, testing of apparatus components |
| H01J 2237/31727 | ..... | Handling mask or workpiece |
| H01J 2237/31728 | ..... | Alignment of the mask or the workpiece |
| H01J 2237/3173 | ..... | Constructional details of particle beam apparatus not otherwise provided for, e.g. arrangement, mounting, housing, environment; Special provisions for cleaning or maintenance of the apparatus |
| H01J 2237/31732 | ... | Depositing thin layers on selected microareas (ion plating H01J 2237/3142) |
| H01J 2237/31733 | ..... | using STM |
| H01J 2237/31735 | ... | Direct-write microstructures |
| H01J 2237/31737 | | using ions |
| H01J 2237/31738 | | using STM |

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|-----------------|-------|--|
| H01J 2237/3174 | ... | Etching microareas |
| H01J 2237/31742 | | for repairing masks |
| H01J 2237/31744 | | introducing gas in vicinity of workpiece |
| H01J 2237/31745 | ..... | for preparing specimen to be viewed in microscopes or analyzed in microanalysers |
| H01J 2237/31747 | ..... | using STM |
| H01J 2237/31749 | ... | Focused ion beam |
| H01J 2237/3175 | ... | Lithography |

WARNING

As from January 1st, 2009 this group and its subgroups are no longer used for classification of new documents. The backlock is continuously reclassified to [H01J 2237/31715](#) and subgroups.

| | | |
|-----------------|-------|---|
| H01J 2237/31752 | ..... | using particular beams or near-field effects, e.g. STM-like techniques |
| H01J 2237/31754 | ..... | using electron beams |
| H01J 2237/31755 | ..... | using ion beams |
| H01J 2237/31757 | ..... | hybrid, i.e. charged particles and light, X-rays, plasma |
| H01J 2237/31759 | ..... | using near-field effects, e.g. STM |
| H01J 2237/31761 | ..... | Patterning strategy |
| H01J 2237/31762 | ..... | Computer and memory organisation |
| H01J 2237/31764 | ..... | Dividing into sub-patterns |
| H01J 2237/31766 | ..... | Continuous moving of wafer |
| H01J 2237/31767 | ..... | Step and repeat |
| H01J 2237/31769 | ..... | Proximity effect correction |
| H01J 2237/31771 | ..... | using multiple exposure |
| H01J 2237/31772 | ..... | Flood beam |
| H01J 2237/31774 | ..... | Multi-beam |
| H01J 2237/31776 | ..... | Shaped beam |
| H01J 2237/31777 | ..... | by projection |
| H01J 2237/31779 | ..... | from patterned photocathode |
| H01J 2237/31781 | ..... | from patterned cold cathode |
| H01J 2237/31783 | ..... | M-I-M cathode |
| H01J 2237/31784 | ..... | Semiconductor cathode |
| H01J 2237/31786 | ..... | Field-emitting cathode |
| H01J 2237/31788 | ..... | through mask |
| H01J 2237/31789 | ..... | Reflection mask |
| H01J 2237/31791 | ..... | Scattering mask |
| H01J 2237/31793 | ..... | Problems associated with lithography |
| H01J 2237/31794 | ..... | affecting masks |
| H01J 2237/31796 | ..... | affecting resists |
| H01J 2237/31798 | ..... | detecting pattern defects (with SEM H01J 2237/2817 ; correcting H01J 2237/31735 , H01J 2237/3174) |

- H01J 2237/32 . Processing objects by plasma generation
- H01J 2237/327 .. Arrangements for generating the plasma
- H01J 2237/33 .. characterised by the type of processing
- H01J 2237/332 ... Coating
- H01J 2237/3321 CVD (Chemical Vapor Deposition)
- H01J 2237/3322 Problems associated with coating
- H01J 2237/3323 uniformity
- H01J 2237/3325 large area
- H01J 2237/3326 high speed
- H01J 2237/3327 Coating high aspect ratio workpieces
- H01J 2237/3328 adhesion, stress, lift-off of deposited films
- H01J 2237/334 ... Etching
- H01J 2237/3341 Reactive etching
- H01J 2237/3342 Resist stripping
- H01J 2237/3343 Problems associated with etching
- H01J 2237/3344 isotropy
- H01J 2237/3345 anisotropy
- H01J 2237/3346 Selectivity
- H01J 2237/3347 bottom of holes or trenches
- H01J 2237/3348 control of ion bombardment energy
- H01J 2237/335 ... Cleaning
- H01J 2237/3355 Holes or apertures, i.e. inprinted circuit boards
- H01J 2237/336 ... Changing physical properties of treated surfaces
- H01J 2237/3365 Plasma source implantation
- H01J 2237/338 ... Changing chemical properties of treated surfaces
- H01J 2237/3382 Polymerising
- H01J 2237/3385 Carburising
- H01J 2237/3387 Nitriding
- H01J 2237/339 ... Synthesising components

Details

H01J 2261/00 Gas- or vapour-discharge lamps

- H01J 2261/02 . Details
- H01J 2261/38 .. Devices for influencing the colour or wavelength of the light
- H01J 2261/385 ... Non-chemical aspects of luminescent layers, e.g. thickness profile, shape and distribution of luminescent coatings

H01J 2329/00 Electron emission display panels, e.g. field emission display panels

- H01J 2329/002 . Cooling means
- H01J 2329/005 . Multi-directional displaying, i.e. with multiple display faces facing in different directions
- H01J 2329/007 . Vacuumless display panels, i.e. with phosphor directly applied to emitter without intermediate vacuum space
- H01J 2329/02 . Electrodes other than control electrodes
 - H01J 2329/04 .. Cathode electrodes
 - H01J 2329/0402 ... Thermionic cathodes
 - H01J 2329/0405 ... Cold cathodes other than those covered by [H01J 2329/0407-H01J 2329/0492](#)
 - H01J 2329/0407 ... Field emission cathodes
 - H01J 2329/041 characterised by the emitter shape
 - H01J 2329/0413 Micro-engineered point emitters
 - H01J 2329/0415 conical shaped, e.g. Spindt type
 - H01J 2329/0418 needle shaped
 - H01J 2329/0421 Pillar shaped emitters
 - H01J 2329/0423 Micro-engineered edge emitters
 - H01J 2329/0426 Coatings on the emitter surface, e.g. with low work function materials
 - H01J 2329/0428 Fibres
 - H01J 2329/0431 Nanotubes
 - H01J 2329/0434 Particles
 - H01J 2329/0436 Whiskers
 - H01J 2329/0439 characterised by the emitter material
 - H01J 2329/0442 Metals or metal alloys
 - H01J 2329/0444 Carbon types
 - H01J 2329/0447 Diamond
 - H01J 2329/0449 Graphite
 - H01J 2329/0452 Fullerenes
 - H01J 2329/0455 Carbon nanotubes (CNTs)
 - H01J 2329/0457 Amorphous carbon
 - H01J 2329/046 Diamond-like carbon (DLC)
 - H01J 2329/0463 Semiconductor materials
 - H01J 2329/0465 Carbides
 - H01J 2329/0468 Nitrides
 - H01J 2329/0471 Borides
 - H01J 2329/0473 Oxides
 - H01J 2329/0476 ... Ferroelectric cathodes
 - H01J 2329/0478 ... Semiconductor cathodes, e.g. having PN junction layers
 - H01J 2329/0481 ... Cold cathodes having an electric field perpendicular to the surface thereof ([H01J 2329/0407-H01J 2329/0478 take precedence](#))
 - H01J 2329/0484 Metal-Insulator-Metal (MIM) emission type cathodes
 - H01J 2329/0486 ... Cold cathodes having an electric field parallel to the surface thereof, e.g. thin

- film cathodes
 - H01J 2329/0489 Surface conduction emission type cathodes
 - H01J 2329/0492 . . . Cold cathodes combined with other synergetic effects, e.g. secondary, photo- or thermal emission
 - H01J 2329/0494 . . . Circuit elements associated with the emitters by direct integration
 - H01J 2329/0497 Resistive members, e.g. resistive layers
 - H01J 2329/08 . . Anode electrodes
- . Luminescent screens
 - H01J 2329/18 . . characterised by the luminescent material
 - H01J 2329/20 . . characterised by the binder or adhesive for securing the luminescent material to its support, e.g. substrate
 - H01J 2329/22 . . with protective, conductive or reflective layers
 - H01J 2329/28 . . Shape or geometrical arrangement of the luminescent material
 - H01J 2329/30 . . Means associated with discontinuous arrangements of the luminescent material
 - H01J 2329/32 . . Black matrix
 - H01J 2329/323 Color filters structurally combined with the luminescent material
 - H01J 2329/326
- . Arrangements of electrodes and associated parts for generating or controlling the electron beams
 - H01J 2329/46 . . Control electrodes
 - H01J 2329/4604 . . . Gate electrodes
 - H01J 2329/4608 characterised by the form or structure
 - H01J 2329/4613 Shapes or dimensions of gate openings
 - H01J 2329/4617 Arrangement of gate openings
 - H01J 2329/4621 Curved or extending upwardly
 - H01J 2329/4626
 - H01J 2329/463 characterised by the material
 - H01J 2329/4634 Relative position to the emitters, cathodes or substrates
 - H01J 2329/4639 . . . Focusing electrodes
 - H01J 2329/4643 characterised by the form or structure
 - H01J 2329/4647 Shapes or dimensions of focusing electrode openings
 - H01J 2329/4652 Arrangement of focusing electrode openings
 - H01J 2329/4656 characterised by the material
 - H01J 2329/466 Relative position to the gate electrodes, emitters, cathodes or substrates
 - H01J 2329/4665 In the same plane as the gate electrodes or cathodes
 - H01J 2329/4669 . . . Insulation layers
 - H01J 2329/4673 . . . for gate electrodes
 - H01J 2329/4678 . . . for focusing electrodes
 - H01J 2329/4682 . . . characterised by the shape
 - H01J 2329/4686 Dimensions of openings
 - H01J 2329/4691 . . . characterised by the material
 - H01J 2329/4695 . . Potentials applied to the electrodes
- . Vessels
 - H01J 2329/86 . .

- H01J 2329/8605 .. Front or back plates
- H01J 2329/861 ... characterised by the shape
- H01J 2329/8615 ... characterised by the material
- H01J 2329/862 .. Frames
- H01J 2329/8625 .. Spacing members
- H01J 2329/863 ... characterised by the form or structure
- H01J 2329/8635 having a corrugated lateral surface
- H01J 2329/864 ... characterised by the material
- H01J 2329/8645 ... with coatings on the lateral surfaces thereof
- H01J 2329/865 ... Connection of the spacing members to the substrates or electrodes
- H01J 2329/8655 Conductive or resistive layers
- H01J 2329/866 Adhesives
- H01J 2329/8665 ... Spacer holding means
- H01J 2329/867 .. Seals between parts of vessels
- H01J 2329/8675 ... Seals between the frame and the front and/or back plate
- H01J 2329/868 .. Passive shielding means of vessels
- H01J 2329/8685 ... Antistatic shielding
- H01J 2329/869 ... Electromagnetic shielding
- H01J 2329/8695 ... Mechanical shielding, e.g. against water or abrasion
- H01J 2329/88 .. Coatings on walls of the vessels ([H01J 2329/18](#), [H01J 2329/868](#), [H01J 2329/89](#) take precedence)
- H01J 2329/89 .. Optical components structurally combined with the vessel
- H01J 2329/892 ... Anti-reflection, anti-glare, viewing angle and contrast improving means
- H01J 2329/895 ... Spectral filters
- H01J 2329/897 ... Lenses

- H01J 2329/90 . Leading-in arrangements; seals therefor

- H01J 2329/92 . Means forming part of the display panel for the purpose of providing electrical connection to it

- H01J 2329/94 . Means for exhausting the vessel or maintaining vacuum within the vessel
- H01J 2329/941 .. Means for exhausting the vessel
- H01J 2329/943 .. Means for maintaining vacuum within the vessel
- H01J 2329/945 ... by gettering
- H01J 2329/946 characterised by the position or form of the getter
- H01J 2329/948 characterised by the material of the getter

- H01J 2329/96 . Circuit elements structurally associated with the display panels ([H01J 2329/0494](#) takes precedence)

- H01J 2893/00 Discharge tubes and lamps**

- H01J 2893/0001 . Electrodes and electrode systems suitable for discharge tubes or lamps

- H01J 2893/0002 .. Construction arrangements of electrode systems
- H01J 2893/0003 ... Anodes forming part of vessel walls
- H01J 2893/0004 Anodes formed in central part
- H01J 2893/0005 ... Fixing of electrodes
- H01J 2893/0006 Mounting
- H01J 2893/0007 Machines for assembly
- H01J 2893/0008 Supply leads; Electrode supports via rigid connection to vessel
- H01J 2893/0009 Electrode system pressing against vessel wall
- H01J 2893/001 .. Non-constructive schematic arrangements
- H01J 2893/0011 .. Non-emitting electrodes
- H01J 2893/0012 .. Constructional arrangements
- H01J 2893/0013 ... Sealed electrodes
- H01J 2893/0015 ... Non-sealed electrodes
- H01J 2893/0016 Planar grids
- H01J 2893/0017 Cylindrical, helical or annular grids
- H01J 2893/0018 Bar or cage-like grids
- H01J 2893/0019 ... Chemical composition and manufacture
- H01J 2893/002 chemical
- H01J 2893/0021 carbon
- H01J 2893/0022 Manufacture
- H01J 2893/0023 carbonising and other surface treatments
- H01J 2893/0024 Planar grids
- H01J 2893/0025 by winding wire upon a support
- H01J 2893/0026 ... Machines for manufacture of grids or anodes
- H01J 2893/0027 ... Mitigation of temperature effects

- H01J 2893/0029 . Electron beam tubes

- H01J 2893/003 . Tubes with plural electrode systems

- H01J 2893/0031 . Tubes with material luminescing under electron bombardment

- H01J 2893/0032 . Tubes with variable amplification factor

- H01J 2893/0033 . Vacuum connection techniques applicable to discharge tubes and lamps
- H01J 2893/0034 .. Lamp bases
- H01J 2893/0035 ... shaped as flat plates, in particular metallic
- H01J 2893/0036 ... having wires, ribbons or tubes placed between two vessel walls and being perpendicular to at least one of said walls
- H01J 2893/0037 .. Solid sealing members other than lamp bases
- H01J 2893/0038 ... Direct connection between two insulating elements, in particular via glass material
- H01J 2893/0039 Glass-to-glass connection, e.g. by soldering
- H01J 2893/004 Quartz-to-quartz connection

- H01J 2893/0041 . . . Direct connection between insulating and metal elements, in particular via glass material
- H01J 2893/0043 Glass-to-metal or quartz-to-metal, e.g. by soldering
- H01J 2893/0044 . . . Direct connection between two metal elements, in particular via material a connecting material
- H01J 2893/0045 . . Non-solid connections, e.g. liquid or rubber
- H01J 2893/0046 . . Lamp base with closure
- H01J 2893/0047 . . Closure other than lamp base

- H01J 2893/0048 . Tubes with a main cathode
- H01J 2893/0049 . . Internal parts
- H01J 2893/005 . . Cathodes
- H01J 2893/0051 . . Anode assemblies; screens for influencing the discharge
- H01J 2893/0052 . . . Anode supporting means
- H01J 2893/0053 . . . Leading in for anodes; Protecting means for anode supports
- H01J 2893/0054 . . . Cooling means
- H01J 2893/0055 . . Movable screens
- H01J 2893/0056 . . Parts inside tubes brought to incandescence by the discharge
- H01J 2893/0058 . . Grids; Auxiliary internal or external electrodes

- H01J 2893/0059 . Arc discharge tubes

- H01J 2893/006 . Tubes with electron bombarded gas (e.g. with plasma filter)

- H01J 2893/0061 . Tubes with discharge used as electron source

- H01J 2893/0062 . Tubes with temperature ionized gas as electron source

- H01J 2893/0063 . Plasma light sources

- H01J 2893/0064 . Tubes with cold main electrodes (including cold cathodes)
- H01J 2893/0065 . . Electrode systems
- H01J 2893/0066 . . . Construction, material, support, protection and temperature regulation of electrodes; Electrode cups
- H01J 2893/0067 . . . Electrode assembly without control electrodes, e.g. including a screen
- H01J 2893/0068 . . . electrode assembly with control electrodes, e.g. including a screen

- H01J 2893/0069 . Tubes for displaying characters

- H01J 2893/007 . Sequential discharge tubes

- H01J 2893/0072 . Disassembly or repair of discharge tubes
- H01J 2893/0073 . . Discharge tubes with liquid poolcathodes; constructional details
- H01J 2893/0074 . . . Cathodic cups; Screens; Reflectors; Filters; Windows; Protection against mercury deposition; Returning condensed electrode material to the cathodic cup; Liquid electrode level control
- H01J 2893/0075 Cathodic cups

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|----------------|-------|---|
| H01J 2893/0076 | | Liquid electrode materials |
| H01J 2893/0077 | | Cathodic cup construction; Cathodic spot control |
| H01J 2893/0078 | ..... | Mounting cathodic cups in the discharge tube |
| H01J 2893/0079 | ..... | Means for limiting the cathodic spot movement |
| H01J 2893/008 | ..... | Means for stabilising the cathodic spot |
| H01J 2893/0081 | ..... | Cooling means |
| H01J 2893/0082 | .... | Returning condensed electrode material to the cathodic cup, e.g. including cleaning |
| H01J 2893/0083 | .... | Liquid electrode level control |
| H01J 2893/0084 | .... | Protection against mercury deposition |
| H01J 2893/0086 | .... | Gas fill; Maintaining or maintaining desired pressure; Producing, introducing or replenishing gas or vapour during operation of the tube; Getters; Gas cleaning; Electrode cleaning |
| H01J 2893/0087 | .... | Igniting means; Cathode spot maintaining or extinguishing means |
| H01J 2893/0088 | .. | Tubes with at least a solid principal cathode and solid anodes |
| H01J 2893/0089 | ... | Electrode systems |
| H01J 2893/009 | ... | Anode systems; Screens |
| H01J 2893/0091 | .... | Anode supporting means |
| H01J 2893/0092 | .... | Anodic screens or grids |
| H01J 2893/0093 | .... | Anodic arms |
| H01J 2893/0094 | ... | Electrode arrangements; Auxiliary electrodes |
| H01J 2893/0095 | .. | Tubes with exclusively liquid main electrodes |
| H01J 2893/0096 | . | Transport of discharge tube components during manufacture, e.g. wires, coils, lamps, contacts, etc. |
| H01J 2893/0097 | .. | Incandescent wires of coils |
| H01J 2893/0098 | .. | Vessels |